COTTON

with which is combined

BOSTON JOURNAL OF COMMERCE AND TEXTILE INDUSTRIES and SOUTHERN MILLS.

Vol. 73 ATLANTA, GEORGIA, APRIL, 1909. No. 6

PUBLISHED MONTHLY BY

COTTON PUBLISHING COMPANY

ATLANTA, GEORGIA, U. S. A.

CHICAGO, BOSTON,
PHILADELPHIA, NEW YORK,
TORONTO, CANADA CLEVELAND, O.

HENRY G. KITTREDGE, Editor.

Address European correspondence to

THE SECRETARY.

MANCHESTER COTTON ASSOCIATION,

22 St. Mary's Gate, MANCHESTER, ENG.

SUBSCRIPTION RATES

DOMESTIC..... FIFTY CENTS PER YEAR
CANADA..... $1.00 PER YEAR
FOREIGN..... $2.00 PER YEAR

Contributions and practical letters solicited.
All accepted matter will be paid for liberally.

Entered at Atlanta Postoffice as Second-class Matter.

Contents.

Cotton Crop of 1908 209
The Home Market is Preferable to the Foreign One ..210
Revision of the Tariff 211
Southern Cotton Manufacturers in Favor of a Protective Tariff 212
Southern Cotton Manufacturers Meet 212
South Carolina 212
National Association of Cotton Manufacturers 213
Southern Textile Association 213
National Association of Hosiery and Underwear Manufacturers 215
Ingrain Carpets and Competing Fabrics 215
Plant for Storing and Compressing Cotton 216
Trade Troubles 217
Electric Drive for Cotton Mills 218
A Mill Should Establish an Ideal 219
Improvements in Future Contracts 220
Charles L. Hildreth 221
Child Labor Laws 221
The Spinning Room 221
The Making of a Thread 222
Concentricity of Rings and Spindles in Ring Frames ..225
Setting of Draft Rollers 226
The Use of Cotton in the Woolen Mill 227
Blending of Cotton and Wool 228
When is Hosiery Yarn Bad 230
The Seamless Footer 232
Standard Scale of Underwear Sizes 233
A Device for Automatically Stopping a Machine 234
Chemicals Used in the Textile Industry 235
Mercerizing Lawns 237
Cotton Market 238
Cotton Yarn Market 238
The Knit Goods Market 239
New England Mill Situation 240
Southern Mill Situation 240
New Machinery and Trade Notes 241

THE COTTON CROP OF 1908.

The Bureau of the Census has published its March canvass of cotton ginned and to be ginned that was grown in 1908, to the effect that the size of the harvested crop is estimated at 13,073,871 bales, of an average gross weight of 505.8 pounds. As our readers recollect, this was approximately our estimate—not less than 13,000,000 bales—made last October of the crop in prospect. To this growth should be added the bureau's estimate of 334,970 bales of linters, making the total amount of cotton ginned from the 1908 growth 13,408,841, against 11,325,882 bales from that of 1907. Reduced to a common basis of 500 pounds per bale the crop of the 1908 growth was 13,563,942 bales; of the 1907 growth, 11,375,461 bales, and of the 1906 growth, 13,595,498 bales, which latter was next to the largest in the history of cotton planting, being exceeded by 55.000 bales in that of 1904. The growth of 1908, which is to be counted in the commercial crop of the current season, is remarkable for its excellent spinning qualities and general cleanliness, thus bringing it into strong contrast with that of 1906 which was poor in quality and grade, and depreciated in value by a large proportion of tinges, unsound staple, etc., causing an extraordinary amount of waste in manufacturing. Measured by its yarn producing qualities, the growth of 1908 may entitle it to the distinction of being more prolific than any of its predecessors.

Because of its superior spinning qualities, the 1908 crop early became attractive to manufacturers here and abroad with the consequence that larger purchases have been made in anticipation of wants further into the future than has customarily been the case in previous years, making it particularly notable when curtailment of mill production and less consumption is taken into account by reason of trade depression. Both Northern and Southern spinners have been free buyers of this season's cotton, especially the Northern, considering their consumptive wants. American spinners, thus far, have bought more than 900,000 bales in excess of what they did a year ago. The result is that there was on the first of March in the hands of our domestic manufacturers 1,844,922 bales, according to the Bureau of the Census, or nearly twenty weeks' supply for normal consumption. The unusually large takings of spinners is further seen in the fact that notwithstanding the rapid marketing of cotton since the opening of the season—nearly 87 per cent. of the prospective crop having already come into sight—the visible supply is less than it was last year at this time when the crop was two million bales less.

There is very little cotton remaining in the hands of producers—only 326,737 bales on March 1—the balance of the crop being chiefly in the hands of manufacturers, and in the possession of warehouses and compresses. Some portion, of course, is always in the hands of transportation companies and in those of outside holders—774,000 bales, March 1. Since the opening of the season on September 1, our manufacturers have added to their stocks in hand over 1,200,000 bales, or enough to place them in a good position

to take advantage of the course of trade for the rest of the cotton year. Considering the amount of cotton that is available for spinning till the advent of the new crop, and the unsatisfactory condition of trade that induces a retrenchment in mill operations, the prospect of prices better than those now prevailing is not encouraging to those interested in the profits of cotton culture.

It would be almost contrary to the natural order of things, allowing for the comparative unremunerativeness of raising cotton, for planters to increase their acreage for cotton this spring. We hear of a general disposition on the part of farmers to follow a course of planting fewer acres with cotton, this year, and it is to be hoped, for their own good, that facts will conform to it. Cotton growing, as a good business proposition, is by no means a vocation without a lucrative reward, if it is only properly conducted with the same degree of judgment that is given to other lines of occupations that are crowned with success. But it can not become lucrative on a satisfactory basis, if ignorance is to govern its operations, as is too often the case to-day. Yet under the best of circumstances the raising of cotton should not control the employment of the farmer to the neglect of other crops and farming avocations that are appropriate for the soil, climate and needs of the estate. The successful planter is one who can market a bale to the acre crop. It can be done, but it will never be the average yield throughout the cotton belt.

THE HOME MARKET IS PREFERABLE TO THE FOREIGN ONE.

There are none more appreciative or cognizant of the immense significance of a large and progressive foreign commerce to this country than ourselves, and especially so as it pertains to an export trade in manufactured as well as in agricultural products. But while this is truly so, we should be remiss in our obligations to the internal welfare and advancement of a mighty citizenship of a virile people, if we were to depreciate the greater opportunities and momentousness that lie within our own territorial realm waiting to be inspired and developed. It is with genuine pride that we can turn to an annual export trade in American products of nearly two billion dollars in value or over $21 per capita of population, of which 27 per cent. represents manufactures ready for immediate use. An analysis, however, of the latter reveals the significant fact that they consist chiefly of articles in which the cost of labor is relatively small or in which inventive ingenuity is a desideratum of consequence. It appears that one-sixth of these exports consists of mineral oils, one-sixteenth of agricultural implements, nearly one-third of metal-working machinery, electrical devices, steam engines, tools, etc., and about one-sixteenth of textile goods, mostly those of cotton. Notwithstanding we are exporting, yearly, half a billion dollars worth of manufactured products ready for consumption, we are sending abroad no more than one-twenty-fifth of what we make, that is, we find a use for our own purposes for $96 of our completed manufactures out of every $100 worth that are made. This being the case it concerns us, as a people, to be more solicitous for the $96 that ministers to our well-being and enrichment as entering into our domestic trade, than for the $4.00 that contribute only in part to our commercial gratification. It is not the small loaf that we are indifferent to or inappreciative of, but it is the large loaf that we chiefly prize as supplying the industrial sustenance that we crave.

A great deal is being written and spoken concerning our export trade in manufactures, as though it should receive paramount consideration in contradistinction to our home trade. Let our foreign commerce receive its full share of attention and promotion as an essential factor in out national life, but do not undervalue or forget the internal commerce that exists or is ready for fructification at our very door if properly encouraged by wise laws of nation and state. Earnest advocates of a policy for extending our export trade in manufactured products by means of commercial treaties or lenient laws, though prejudicial they may be to domestic industries under a high standard of social living, refer with much frequency to the commercial policy of Germany which exports twice the value of manufactured articles than the United States, though having but little more than two-thirds of the population of the latter and less than one-fourteenth of its territorial area. These declare that "it is her foreign markets that give Germany her industrial prosperity; indeed it is her foreign markets which enable Germany to live." The commercial policy that is being pursued by Germany, and it may be said by other European countries, is the only one that can be followed under the conditions which control their existence. But the same policy can not be made economically applicable to the conditions prevailing in the United States with its social requirements, as exhibited in the manner of living among the people, and its immense opportunities that are being unfolded and utilized with a rapidity and stupendousness with which its industrial enterprises can scarcely keep pace. The United States is equal in area to fourteen German empires, and free trade exists among the people of this vast realm, living under like institutions, experiencing like aspirations, and possessed with like wants and social environments. Germany has a population of 290.4 per square mile against 28.7 for the United States—ten times greater density. The labor and activities of this comparatively dense population are forced by necessity to find an outlet for its productive energy through channels leading to markets that stand in need of it and can absorb it. The position of the United States is different, in that it has a homogeneous existence, commercially, industrially, and socially, and, what is of more importance, it has an absorbing power far in excess of that of any other nation.

Measured by the purchasing and consuming power of the people of the United States, the population of this country is twice as large as that of the Chinese empire; or not much less than the entire population of Asia. Viewed in this light or from this point of observation the marvellous significance of the American market is apparent, and its preservation for American manufactures is worthy of the keenest consideration on the part of legislators when any proposition of reciprocity or compromise is being urged or discussed, which may lead to the modification of customs laws to the detriment of domestic industrial efforts.

More of everything upon which livelihood depends is consumed by the American people than by any others in the world. For instance, the people of this country consume thirty pounds of cotton per capita., in the form of manufactures. No other people approach such an amount. It is, in a sense, beyond comparison. The people of British India consume only 3.5 pounds, per capita, including the quantity imported in the form of yarns and fabrics added to the domestic product for local consumption. Measured by the amount of cotton goods used, per capita, the population of the United States, as an industrial and economic

factor in the commerce of the world, is of two and a half times more importance than that of all Asiatic India.

Many do not seem to realize the immensity of our own domestic market and its great possiblities, far in excess of what can be secured abroad under the most favorable circumstances. There are too many who are unconsciously, no doubt, willing to barter away our markets for our own domestic manufactures in consideration of obtaining some supposed reciprocal advantage by permitting the freer entrance of foreign goods to compete with those of our home production. "Serve yourself, if you be well served, is an excellent adage," applies to a nation as well as it did to Miles Standish in his courtship. The policy of congress in its dealings with questions affecting the trade of this country, both internal and external, should be so directed as to serve well and first the industrial pursuits of our people for their own mutual advantage.

REVISION OF THE TARIFF.

At present writing, the customs tariff as revised by the committee on ways and means of the national congress is before the house of representatives for discussion. So far as the schedules relating to textiles are concerned, there has been, as a rule a marking up instead of a marking down of the rates, indicating more of a readjustment than a revision downward. At the best, the bill that has been introduced can not be considered other than tentative, and it may be said with every assurance that it will receive many amendments, even by its friends in the house and senate, before it passes congress and becomes enacted as a law. Such has been the fate of many of its predecessors, and it can scarcely be expected to be an exception. As has been the case with previous tariff bills the senate will modify its provisions very materially and bring it into shape for final adoption. The house proposes but the senate disposes, notwithstanding its revenue features, which constructively, must have their initiation in the former body.

The bill as launched is a thoroughly protective measure, and there is no apparent possibility of its being shorn of this characteristic during any period of its career. No complaint can be entered against it by manufacturers of cotton as furnishing insufficient protection to preclude all branches of the industry from standing up, most effectually against foreign trade aggression of the most pronounced type. The rates of duty as now proposed are practically prohibitive against the importation of every description of cotton manufacture that America manufacturers are willing to undertake to produce. Under such an act, there is no reason why the cotton manufacturing industry in all of its present and possible aspects, should not be able to easily defy foreign encroachment upon the American market, except for goods that are not made here. American manufacturers have their home market to themselves, and are thus left to fight it out among themselves for existence, and this competition is the consumers' salvation against monopolistic oppression in the way of unreasonable prices. The rates of duty that have been proposed may be no higher than necessary for the needs of the industry; but even assuming this to be the case, the effect upon prices on the domestic article will be nil or scarcely noticeable, as the 1897 tariff has proved itself as highly protective as the one now being debated, except on the very finest counts of yarn above No. 200. As a matter of fact, very little—less than 3,000 pounds—cotton yarns are imported as fine as 200s.

The bill suggests no changes in the wording of the cotton cloth paragraphs, more than an addition to the paragraph defining the meaning of the term "cotton cloth," and the term "thread" or "threads," for the purpose of counting and determining the classification of cloth for fixing the rate of duty. This addendum is the most vital modification proposed, and its effect is to advance the rates of duty on cloth especially that made from two or more ply yarn. Under the present law, very little cloth is imported finer than 200 threads per square inch. in which all threads, whether one, two or more ply, are counted as singles for tariff classification. It would seem from this that there is no special need for this great advance in the tax on imports. This form of increasing the duty on cotton cloth will have little or no effect on imports, as, already, they are too small to have any serious affect on the industry.

The knit goods manufacturers are well treated in the new bill, especially those producing stockings, hose, etc. No change is proposed on knit underwear, but on stockings, etc., an advance in rates has been made of fully 40 per cent. on goods valued at $2.00 or less per dozen pairs; on those valued between $2.00 and $3.00 per dozen pairs the advance is 25 per cent.; on those valued above $3.00 per dozen pairs no advance is suggested. The principal competition the American hosiery manufacturer has with foreign goods are those under $2.00 per dozen pairs, of which about 5,000,000 dozen pairs are annually imported. This additional protection is needed and should stand in the final framing of the act.

Adequate protection to our manufacturers by means of a customs tariff is very generally recognized by people and legislators regardless of party affiliations. Both of the great parties agree upon this principle as a broad proposition, though differences may exist as to the degree of its application. This is especially the case with those who are more or less directly dependent on the welfare of the manufacturing industry—the investor, the employe, and their dependents. There are no free traders, enough to speak of in the country, not even those who believe in a revenue tariff only. Protection to American industry against the comparatively low labor cost of Europe and elsewhere is the watchword in all legislative acts, from whatever source they may be suggested. The principle of protection, as expressed in a tariff on foreign commodities, is as nearly non-partisan to-day as it is practically possible. This is to be observed in the protests of Democratic members of congress against the act of the Republican members of the committee on ways and means in lowering the rates of duty on lumber and manufactures of iron and steel, and obliterating those on iron ore and cattle hides. These Democrats, who, as a component part of a party organization, are presumed to be for a revenue tariff, are from constituencies in the South and West—Alabama, Tennessee, Texas and the middle West—engaged in occupations that are affected by the status of these products in competition with those of foreign countries. It would not be the strangest thing in the world to see the Democratic party reach out for the banner of protection and its willing delivery by the Republican party, which, in New England, for example, is liberally disposed toward extending our foreign commerce on some basis of reciprocity, if need be,

though it may involve material concessions in the imposts on foreign goods. One thing is clear, there is a good deal of independent thinking and acting on the part of the people, and each man or community is going to study its own material interests regardless of any political party dictum.

SOUTHERN COTTON MANUFACTURERS IN FAVOR OF A PROTECTIVE TARIFF.

A representative gathering of Southern cotton manufacturers was held in Atlanta last month, as noted elsewhere in this issue, to discuss the tariff situation in so far as it may relate to the classification and rates of duty applicable to imports of foreign yarns and cloth. There was no dissenting voice to the principle of protection that should be extended to all manufactures of cotton—coarse as well as fine.

The position of the cotton manufacturing industry in this country in relation to that existing in Europe is too evident and unequivocal to permit one from reaching any other conclusion than that demanding tariff protection from foreign encroachment upon our home market in unequal competition with the products of domestic manufacture. Though Southern manufacturers may not stand in such urgent need of tariff protection as do those in New England, they are not invulnerable to the commercial assaults of foreign competitors, and even if they were independent of the latter and stood in no fear of them, they should still make their views known, as they have done, most decisively in favor of the principle of adequate protection to the fine manufactures of the North and the increasing ones of the South, in which the high cost of skill labor is a factor of first consequence. While some of the cotton cloths of the South can compete successfully in foreign markets with those made by European mills, they are, after all, made in no great quantity, and these wherein the cost is small in labor and chiefly in that of the raw material which can be obtained on more favorable terms than those vouchsafed to foreign mills. The average make of cotton goods, whether cloth or yarn, manufactured in the South demands for the existence of the industry a protective tariff to the extent, at least, of one-fifth of a cent per number per pound on all numbers exceeding No. 15, and up to and including No. 30, the average Southern production lying between these numbers; and an equivalent of 25 per centum on cloth, the same as is provided in the tariff bill reported by the house committee on ways and means.

SOUTHERN COTTON MANUFACTURERS MEET.

The Present Tariff on Cotton Manufactures Believed to be an Equitable Measure. A Uniform Sale Contract between the Manufacturer and Buyer Is Urged.

A number of prominent and public-spirited cotton manufacturers of the South met in Atlanta, March 16, at the Piedmont Hotel, to consider the question of the proposed revision of the customs tariff, in its relation to the cotton manufactures of the South, and that of a uniform sale contract for goods, as suggested by the two national associations of cotton manufacturers, as fully alluded to elsewhere in this issue under the title of "Standard Specifications for Staple Gray Goods."

Those present at the meeting were unanimously in favor of the tariff remaining as it is, without change, as an equitable protection measure for the cotton manufacturing industry of the South. A uniform sale contract was believed to be of great importance to the trade, if made with a just regard to the rightful claims of both manufacturer and buyer.

The meeting was presided over by T. H. Rennie, of the Pell City Manufacturing Co., Pell City, Ala.

The resolutions on the revision of the tariff were as follows:

"1. In the present revision of the tariff by congress nothing should be done that would injure or retard the development of textile industries in these States.

"2. The existing relative position as between the different sections of our country shall be preserved.

"3. Each State organization immediately appoint a committee not exceeding three to fully represent it, and who shall attend at Washington on call of the chairman of this meeting.

"4. The present movement to revise the tariff is now injuring all lines of business, and it is of the utmost importance that the action taken shall be completed as promptly as possible.

"5. We urge upon each separate State organization the importance of taking action and making recommendation on the subject of a tariff commission."

In regard to a uniform sale contract the following resolution was passed:

"Whereas, abuses have crept into the textile business in that unscrupulous buyers have, at times, attempted to unfairly take advantage of a declining market to cancel orders, it is therefore

"Resolved, That we indorse the movement to effect a uniform sale contract, and that all manufacturers be urged to make replies to the circular letter sent out by the National Association of Cotton Manufacturers and the American Cotton Manufacturers' Association."

SOUTH CAROLINA.

Mill Inspectors. Corporation Credit. Privilege of Stockholders.

An act has been passed by the legislature of South Carolina, providing for two inspectors, who are to work under the supervision of the Commissioner of Labor and Immigration. The act maps out the work to be done, and it is stated that it will require all their time to do it properly.

Another bill affecting mill companies has been ratified, prohibiting the use of the credit of any corporation by any individual officers, etc.

Another new law has been passed, known as the Kurtz Smith act, under the terms of which any mill stockholder can, upon written request, secure a complete financial statement of the condition of the company. The law is designed to meet numerous complaints of inability to secure such statements. However, the new law does not make it obligatory that a list of all creditors shall be furnished, or that such affairs of the company as should not be given out to indiscreet and meddlesome stockholders shall be furnished.

Seventy-four per cent. of the textile manufacturers in North Carolina favor compulsory school law, 14 per cent. oppose it, and 12 per cent. express no opinion upon the question.

THE NATIONAL ASSOCIATION OF COTTON MANUFACTURERS.

The Annual Meeting April 28-29.

The National Association of Cotton Manufacturers has decided to hold its annual meeting at Boston, Mass., Wednesday and Thursday, April 28 and 29. The sessions will be held at Mechanics Building on Huntington Avenue.

Great interest is anticipated in the forthcoming report of the committee on the "Standard Specifications on Plain Gray Goods," which committee submitted a preliminary report at the meeting held at Saratoga Springs last September.

Among other subjects which are expected are, Transportation for Mill Yards, Cotton Futures on the New York and New Orleans Cotton Exchanges, Commutator Grinding, Air Conditioning for Cotton Mills, Finishing and Bleaching, Loom Improvements, Losses in Cotton Due to Moisture and Other Causes, Additional Top Strippers on Revolving Flat Cards, Scientific Methods in Warp Sizing, Automatic Looms, Economy in Steam Generation, Cotton Fibre Substance and Its Properties, Advantages of Variable Speeds for Ring Spinning and Later Forms of Spindles.

The association has received an invitation to send a number of delegates to attend the sixth international congress of the International Federation of Master Cotton Spinners' and Manufacturers' Association, which will be held at Milan, Italy, on the 17th and 19th of next May.

Standard Specifications for Staple Gray Goods.

The committee on "standard specifications on staple gray goods," referred to above, has sent to the members of the two cotton manufacturers' associations,—the National and the American,—a copy of tentative specifications covering the features of width, count and weight, that it is ready to recommend for adoption, which may be used in all transactions involving purchase and sale of staple gray goods by contracts and by sale notes.

These specifications are as follows:

Width.—The width shall not vary anywhere by more than ⅜ of an inch below the stipulated width, nor more than ¾ of an inch above. The width shall not be uniformly less than the stipulated width, but must, at least in some places in each piece, be equal to, or greater than, the stipulated width.

Warp Count.—Except within four inches of the selvage, the number of warp threads per inch shall not vary anywhere by more than one thread per inch below the stipulated count, nor by more than two threads per inch above. The number of threads per inch shall not run below the stipulated count throughout the piece, but must, at least in some places in each piece, be equal to, or more than, the stipulated count.

Filling Count.—The number of threads in the filling, or weft, shall not vary anywhere by more than three threads per inch below the stipulated count, nor by more than six above. In the case of satteens, however, when the count of filling exceeds the count of the warp, the allowance for variation above specified shall be increased by the same percentage that the filling count exceeds that of the warp count. In any case, the filling count per inch shall not run below the stipulated count throughout the piece, but must, at least in some places in each piece, equal, or be more than, the stipulated count.

Weight.—Goods shall not vary from the stipulated weight on either side by more than 3 per cent. in any one piece, or 1½ per cent. in the average of any bale or roll. In case of controversy regarding the weight of goods, decision shall be based on goods which have been exposed for twenty-four hours to a temperature of 80 degrees F. and a humidity of 70 per cent.

The word piece, as used above, refers to a length of about 50 yards.

Comments on Committee's Recommendations.

In commenting upon the recommendation of this committee, the following communication has appeared in the "Journal of Commerce," New York.

"A practice has grown up in the past few years of selling certain constructions of cloths by the count per inch regardless of what the threads in the full width should be. The count per inch should indicate a certain number, of threads in the warp and filling, either in a limited area or in any spot on which a glass may be placed. But it has come to be an accepted fact with many users of gray cloths that if the weights are reasonably accurate, and if the finish desired is secured, the count itself means little. Unfortunately, it did mean a great deal when a showdown was threatened last year, and rather than to submit to a test of cloths many manufacturers accepted cancellations.

"An ordinary 4-yard 56x60 sheeting calls for 2,016 threads in the warp, but many so-called 56x60s contain much less than 2,000 threads and are fully acceptable to buyers.

"Some years ago the buyers of staple standard prints insisted that three should be 1,972 threads in the warp and equally as many threads in 28 inches of the length of the cloth, in the filling. Nowadays, there are thousands of yards of so-called standard 28-inch 64x64s made and sold that count as low as 1,760 threads in the warp. The standard 38½-inch 64x64s, used by printers, converters, bleachers and others, should contain 2,464 threads in the warp, yet there are many goods being delivered that contain much less than 2,450 threads.

"At first glance this practice might seem like a plain evasion of contract obligations, as the cloths are sold under clauses in sale notes calling for 56x60s, 64x64s and so on. But in a great many cases buyers have come to recognize special values in certain cloths called nominally 56x60s or 64 squares, made by certain mills, and are quite content to accept them without count or without question. The explanation is that many mills sacrifice threads in the warp so that they may use a heavier filling, not only bringing up the weight of the cloth to the required specifications, but also providing a cover for the cloth that results in a smoother face.

"The mill making a straight 56x60 4-yard sheeting can not secure as good a cover on its cloth as the mill making a cloth counting 54 or 55 threads an inch in the warp and using a coarser and heavier filling that will make a smoother faced fabric.

"Even if the new contract specifications suggested by the cotton manufacturers' association were adopted it is very doubtful if they would be fully accepted for a long time because of the peculiar conditions surrounding the purchases now made by certain users of cloths. There are many converters who are more interested in the finish of their fabrics as having an effect on their sale than they are in the technical details of their construction. It was only when cancellations were forced by threats of exposing the actual deliveries on contracts that manufacturers woke up

to the dangers ahead of them in delivering something that pleased the customer but did not strictly comply with the terms of the sale notes.

"There are many printers who have been taking low count goods for years knowing them to be low count in the warp, but thoroughly satisfied with them because of the finish obtainable on the goods in consequence of the heavier filling yarns used.

"Some mills used to add a few threads to the warps for the sake of having a better selvage and giving full count at any point in the width of the fabric, but that day has long since passed. Nowadays no one expects a cloth to show full count within a few inches of the selvage because in that space the reed is so made that there will be ample allowance made for the selvage threads. This explains why the National Cotton Manufacturers' Association uses the expression: 'Except within four inches of the selvage' in specifying how the warp count should be made."

EXPLANATORY ADDENDUM BY COMMITTEE ON SPECIFICATIONS.

Since the committee made its tentative recommendations as above, it has issued a comprehensive explanation of their purport as follows:

"Up to the present time, in this country, there has been no law, trade rule, or even custom, that has defined the trade meanings of the three simple specifications (width, count and weight) by which staple gray goods are usually described. Every practical man knows that goods can not be made so that they will be, in every particular, exactly according to those three nominal specifications, and that there will be variations therefrom. This committee has been asked to help establish some standard limits of variation from these three general descriptions that may be used in the case of ordinary transactions as a basis for determining what is good delivery.

"Perhaps the use of the word 'specifications,' as applied to the name of our work, has been misunderstood, this being a term not much used in the cotton goods trade. By it, we mean simply a determination of allowable variations from the ordinary nominal designations of width, count and weight, and so drawn as to be perfectly practicable and fair to the manufacturer on the one hand, and to the buyer or consumer on the other. The problem involves only practical or manufacturing points, and no direct legal points whatever. When a man builds a house, he usually takes care to see first, that his plans and specifications describe as clearly as possible what he wants built; then, through a contract, he turns them over to the builder to execute. The work of this committee is simply to provide clearness of specifications for those who wish to contract, i. e., to manufacture, to sell, and to buy. In the very nature of things, there can be nothing obligatory about the use of our 'specifications.' Its use must be permissive in each case, except as custom may demand it.

"Some think that present conditions are plenty good enough. Some even think it is a mistake to discuss such details in public. Some would prefer to take their chances in the present state of uncertainty, than to have things made clear. It is only by an intelligent understanding of the tools which one is working that one can work satisfactorily. The better the understanding between manufacturers, selling agents, brokers, and buyers, in regard to the material they are trading in, the better can each one perform his part of a transaction, and the more easily will trade in general move. We are by no means the first country to attempt improvement in this direction. Austria has trade regulations in force on all of the points mentioned, and on others, some of the other countries of Europe have pretty definite commercial customs. The statement that we have neither will probably be combatted by some, but it is a fact. Herein, then, the committee finds reason enough for its existence.

"There is nothing in the committee's work to require drastic changes in the forms of sales notes now in use, in fact, not any changes at all. The 'specifications' are simply a set of rules to determine more clearly what is meant in the trade by the nominal width, count and weight, stated on such sales notes, or to form a basis for arbitration, should difficulties over such points arise.

"One detail of the 'tentative specifications' that has been criticised considerably is the extent of variation permitted,—the statement being advanced by some buyers that they could not use goods with such variations, because, for instance, they would allow the manufacturer to make half a piece varying from the nominal by the maximum and half by the minimum. In connection with width, this would mean, for 36-inch goods, one-half a piece 35⅝ inches, and the other half 36¾ inches. No manufacturer, however, could or would, willingly make goods that way. A wide inquiry, and exhaustive data, indicates that under the 'tentative specifications,' a manufacturer would have to do good work, and aim to give full width, count and weight, if he is, on the one hand, to make each piece in some places equal to, or greater than, the specified width, count and weight, and, at the same time, come within the limits of variations allowed. Regardless of what people think they are making, or think they are buying, facts, obtained by the committee from a very wide range of sources, prove that the limits specified are smaller, rather than larger, than those found very generally in goods being manufactured, sold, and bought to-day. This statement can readily be put to the test by any manufacturer or buyer who will make a really exhaustive test of the width, count and weight of the goods which he is manufacturing or buying.

"Variation limits have not been expressed in percentage for two reasons:

1. Because fixed differences are much more intelligible to most employees of the manufacturer, as well as of the consumer.

2. Because quite exhaustive investigation indicates that, in 95% of what may be called staple goods, fixed limits come much nearer the practical truth than percentages.

"Two general problems have been given to this committee to work upon, if not to solve. One is to further clarify the present cotton goods specifications on width, count, and weight, as indicated above."

SOUTHERN TEXTILE ASSOCIATION.

In accordance with the resolution passed at the Dec. 26th meeting of the Southern Textile Association the next meeting is to be held at Greenville, S. C., April 10.

The program committee is preparing an excellent program of papers by practical men.

This association is composed entirely of superintendents, overseers, master mechanics, etc., and its only object is the better education of the practical mill men of the South.

E. E. Bowen is secretary, overseer of weaving at Great Falls Mfg. Co., Rockingham, N. C.

NATIONAL ASSOCIATION OF HOSIERY AND UNDERWEAR MANUFACTURERS.

Annual Convention and Exhibition at Philadelphia, May 10th to 15th.

The convention will be held May 11, 12 and 13 at the Continental Hotel, Ninth and Chestnut Streets, Philadelphia, and the exhibition from May 10 15, both inclusive, at 919-921 Walnut Street.

The following is the convention programme:

On Tuesday, the 11th, the first, or morning session, will begin at 10:30 o'clock, with a preliminary meeting of the underwear and fancy knit goods manufacturers, for the purpose of perfecting arrangements for the division of their interests into sub-associations. Prior to this session will be convened the various hosiery sub-associations in various rooms to be announced at the time. The afternoon session will be one to which the hosiery, underwear and fancy knit goods manufacturers will be invited, both members and non-members.

The morning session of Wednesday, the 12th, will be devoted to knit goods manufacturers only. The afternoon of this day will be devoted to meetings of the various sub-associations.

The morning session of Thursday, the 13th, will be an executive one, at which will be presented reports from various committees, the election of officers, appointment of committees, new business, etc. The afternoon of this day will be devoted to the meetings of the various sub-associations. The evening of this day will probably be devoted to a banquet upon a subscription basis, so much per plate, to those who wish to attend.

Conditions and circumstances may, and doubtless will, require adjourned conferences of some of the sub-associations, which will be held on Friday and Saturday.

INGRAIN CARPETS AND COMPETING FABRICS.

The carpet manufacturers of Philadelphia have issued a statement in regard to the tariff on their industry.

"For many years the carpet factories of Philadelphia teemed with activity, and it appeared impossible to satisfy promptly all the orders that poured in upon them. This was particularly true of the ingrain carpet works.

"The manufacture of ingrain carpet was the real backbone of the American industry. It was the carpet of the poor and the middle classes, to be seen in the house of almost every farmer and every mechanic in the land. It had no rival for cheapness, combined with durability.

"To-day, it is said, the ingrain carpet is rare. Persons who desire the lowest priced floor covering purchase imported matting; and when they are willing to expend a little more money they buy American brussels, some grades of which are not very much higher in price than ingrain formerly was. Chinese and Japanese mattings have been on the customs free list for about 15 years.

"Kensington used to be alive with the whirring of ingrain carpet looms. In 1886 the ingrain carpet manufacturing constituted 80 per cent. of the carpet manufacturing of the United States. Now it is a bare 20 per cent., and within 10 years about 25 concerns which manufactured ingrain carpet in Kensington have become bankrupt. In almost all such cases that have occurred within two or three years, the ingrain carpet looms have been broken up and sold for junk. Looms which cost $650 each now bring at auction about $18.50.

"The great majority of the concerns which have been engaged in making ingrain carpets have already discarded most of their ingrain looms and have erected in their stead broad looms for rugs—mostly imitation axminster. Three concerns only have taken up the manufacture of what is known as fiber carpet, the principal compound of which is paper. The retail price of this carpet is about 40 cents a yard. That of imported matting is from 12 to 30 cents a yard when bought by the roll. But the paper carpet is said to outwear the imported matting three times over, which fact makes it intrinsically cheaper than the latter.

"Still the carpet manufacturers say that ingrain carpet would be much preferred to either matting or the fiber carpet if it could be offered at a competing price.

"An important factor in the making of cheap carpets is the cost, delivered in this country, of the coarsest foreign wools. The kind principally used comes from China, and it is not produced in this country at all. It is said to be fit for nothing but carpet making. It was admitted free under the Wilson tariff bill, and now pays a small duty, the wholesale price in this market remaining approximately what it was in the second Cleveland administration. The men interested in the ingrain carpet business would like to have congress take the duty off this coarse China wool entirely, and at the same time put a duty of about 1½ cents a yard on Chinese and Japanese mattings."

Table for Numbering Yarn by Grains.

No. of Yarn.	Grains per Hank.	No. of Yarn.	Grains per Hank.	No. of Yarn.	Grains per Hank.
9	777.77	20¼	344.44	31⅓	222.22
9¼	756.75	20½	341.46	31¾	220.47
9½	736.84	20¾	337.34	32	218.75
9¾	720.51	21	333.33	32¼	217.05
10	700.00	21¼	329.41	32½	215.38
10¼	682.92	21½	325.58	32¾	213.74
10½	666.66	21¾	321.83	33	212.12
10¾	651.16	22	318.18	33¼	210.52
11	636.36	22¼	314.60	33½	208.95
11¼	622.22	22½	311.11	33¾	207.40
11½	608.69	22¾	307.69	34	205.88
11¾	595.74	23	304.34	34¼	204.30
12	583.33	23¼	301.07	34½	202.89
12¼	571.42	23½	297.87	34¾	201.43
12½	560.00	23¾	294.73	35	200.00
12¾	549.01	24	291.66	35¼	198.58
13	546.15	24¼	288.65	35½	197.32
13¼	526.11	24½	285.71	35¾	195.80
13½	518.51	24¾	282.82	36	194.44
13¾	509.09	25	280.00	36¼	193.10
14	500.00	25¼	277.22	36½	191.78
14¼	491.22	25½	274.50	36¾	190.47
14½	482.75	25¾	271.84	37	189.18
14¾	474.57	26	269.23	37¼	187.91
15	466.66	26¼	266.66	37½	186.66
15¼	459.01	26½	264.15	37¾	185.42
15½	451.61	26¾	261.68	38	184.21
15¾	444.44	27	259.25	38¼	183.00
16	437.50	27¼	256.88	38½	181.81
16¼	430.76	27½	254.54	38¾	180.63
16½	424.24	27¾	252.52	39	179.48
16¾	417.91	28	250.00	39¼	178.34
17	411.76	28¼	247.78	39½	177.21
17¼	405.79	28½	245.61	39¾	176.10
17½	400.00	28¾	243.46	40	175.00
17¾	394.36	29	241.37	40¼	173.91
18	388.88	29¼	239.31	40½	172.83
18¼	383.56	29½	237.28	40¾	171.77
18½	378.37	29¾	235.29	41	170.73
18¾	373.33	30	233.33	41¼	169.69
19	368.42	30¼	231.40	41½	168.67
19¼	363.63	30½	229.50	41¾	167.66
19½	358.97	30¾	227.64	42	166.66
19¾	354.43	31	225.80	42¼	165.68
20	350.00	31¼	224.08	42½	164.70

WHITIN MACHINE WORKS.

Eight-five per cent. adult employees in the textile mills of North Carolina read and write, and 80 per cent. of children.

PLANT FOR STORING AND COMPRESSING COTTON.

The object of the scheme here illustrated is to provide a compress consisting of warehouses, sheds and cotton presses, arranged in certain relation to each other, and systems of trolleys for carrying the bales of cotton from the point where they are unloaded, to the presses, to the warehouses, and also the point where they are shipped, thereby enabling the cotton to be handled expeditiously and economically.

Figure 1, is a diagrammatic view illustrating a plant constructed in accordance with the scheme. Figure 2, is a transverse sectional view taken through one of the compress sheds and warehouses.

The plant comprises two trolley systems, one which may be referred to as the "platform system" being utilized for conveying the cotton from the cars to the sheds in which the presses are located and from the warehouses to the cars in which the cotton is re-shipped, and the other system which may be referred to as the "overhead system," being utilized for conveying the cotton from the presses to the warehouses.

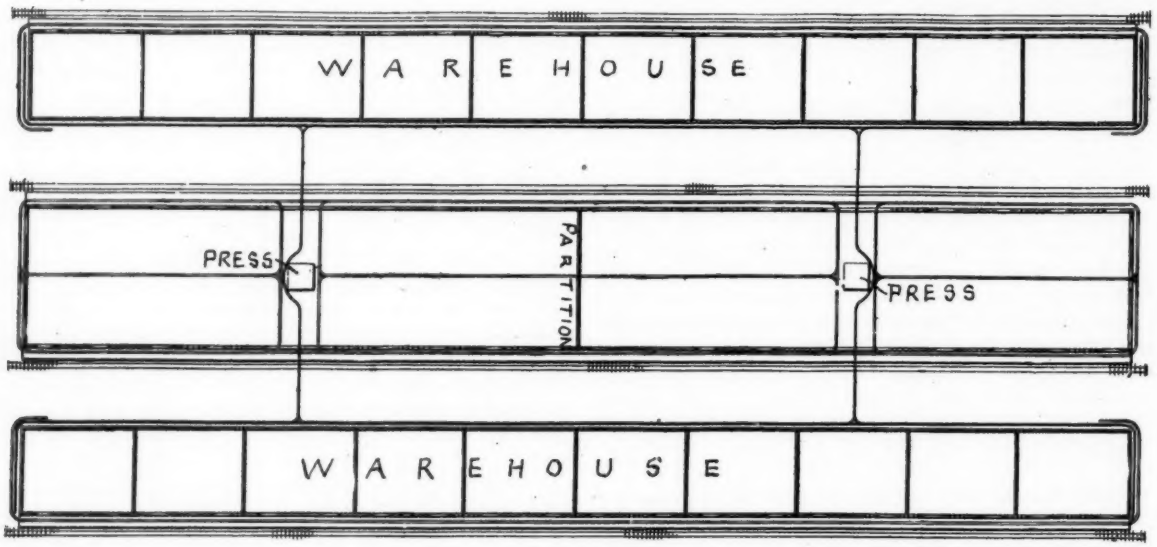


FIG. 1.

Referring to Figure 1, the oblong-shaped building in the center consists of two sheds with central partition. Arranged on either side of this building is a row of warehouses. At approximately the center of each of the sheds in the central building is a cotton press. By locating the presses at the points indicated a great saving is effected in the handling of the cotton, due to the fact that each press is approximately in the center of a large square, the sides of which are the width of the plant and one-half of its total length so that the cotton can be grouped around the presses and thus overcome the necessity of carrying it a great distance.

Extending alongside of the sheds are receiving platforms and extending longitudinally of the platforms are railroads sidings, thereby enabling the cotton to be unloaded from the cars onto the platforms. Shipping platforms extend along the outside of the rows of warehouses with railroad sidings adjacent to the platforms, as shown, so that when the cotton is to be reshipped it can be carried from the warehouses to any point on the platforms at which the outbound freight cars are located.

The platform trolley system, consists of a track extending along the outside of the sheds and supported by brackets at a sufficient height above the receiving platforms to permit people to pass thereunder, and a track extending along the rows of warehouses above the platforms and also across the endmost warehouses in each row. On the inside of the sheds are two parallel transversely extending tracks between which the press is located and also two longitudinally extending tracks, said tracks connecting with the cross tracks and connecting with the outside track, switches being located at the points where the tracks intersect. The trolleys or conveyers can be operated by electricity, cable, gravity, or any motive power.

After the bales of cotton have been unloaded from the cars onto the platform extending along the sides of the sheds they are hooked onto the trolleys which carry them to the presses or at some point within the sheds away from the presses on the longitudinally extending tracks. By utilizing a system of this character the necessity of switching the inbound freight cars is overcome so as to locate them at any particular point on the receiving platform and as hand-trucking of the cotton for long distances is eliminated a great saving in time and also cost of labor is effected.

If the cotton is to be stored after it has been compressed it is carried by the trolleys of the overhead system to the warehouses and when it is re-shipped it is carried by the trolleys which travel on the tracks of the platform system to any point on the shipping platforms where the outbound freight cars may be located.

The overhead system consists of tracks which are located adjacent to the roof of the sheds and extend from the presses to tracks extending along one side and the ends of the rows of warehouses. The trolleys or conveyers of the overhead system are provided with means for raising the bales to a sufficient height to clear the tracks of the platform system and also the freight cars standing on the railroad sidings, as shown in Fig. 2.

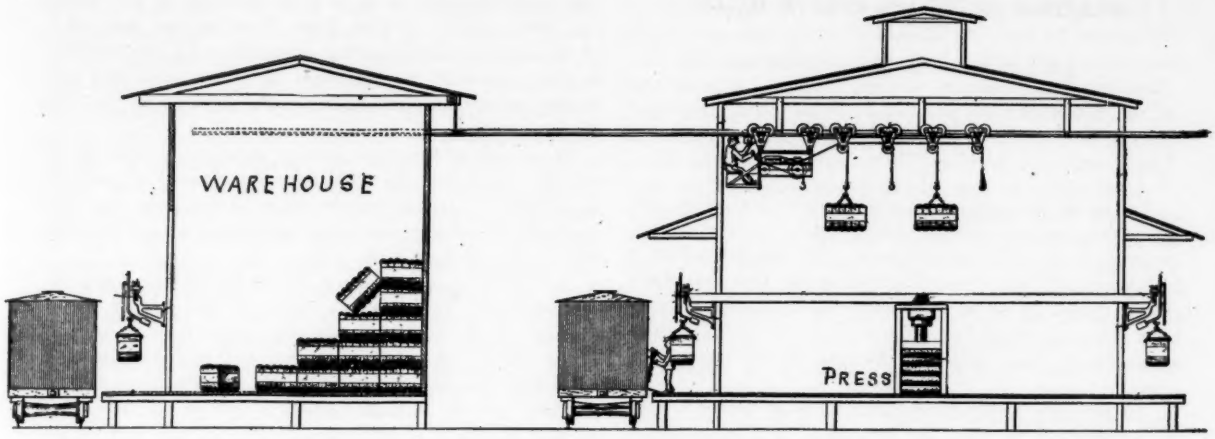


Fig. 2.

After the bales have been carried across the railroad tracks from the sheds to the warehouses they are conveyed by the trolleys of the platform system to any one of the warehouses in the row. Another advantage of the overhead system is that it can be utilized for piling or unpiling the bales of cotton. In Fig. 2 is shown the trolleys of the overhead system as consisting of a plurality of trailers coupled together and pulled by a motor, Ropes which extend downward from the trailers have bales of cotton connected thereto, and the motor is provided with a drum onto which the ropes are wound for elevating the bales of cotton to the required height. While the overhead system is preferred in conjunction with the platform system it would, of course, be possible to use merely a platform system and have an elevator on which a train of conveyers can be placed, then elevated enough to carry them over the freight cars, then lowered on the other side and carried along to the warehouses.

TRADE TROUBLES.

Orders Are Not Placed Early Enough. Time Is Required to Produce Goods.

Mr. Wood, the president of the American Woolen Co., in discussing the troubles of the trade, stated recently that the bottom of most of the troubles which the trade experience with the manufacturer, and which they do not seem to appreciate or to understand, is their failure to place their orders early enough for the machinery to manufacture them and to make the deliveries which they so much desire later.

Everybody knows that there is a limit to the speed of machinery. No mill agent to-day who knows his business but what strenuously strives to please the customer and to get out his goods on time. No good merchant to-day but what knows that the complications and varieties of fabrics now required by the trade are absolutely different from what were required a number of years ago, when things seemed to run along certain lines or classes of fabrics in large volume and a small variety of styles. All this is changed.

There are greater numbers of fabrics and greater varieties of styles, all more complex and complicated than ever before, in colorings and other requirements, and as looms can weave but one style at a time, it stands to reason that one style must be run out before another is put in, and if sample pieces are required of this infinite variety of styles, time must be required to produce them.

If customers are late in placing their orders, they have one of two situations to face—either a failure in getting their wants on time, or a total failure in getting anything at all.

In a mill with its limited number of looms and an infinite number of styles, the manager of the mill has to arrange to the best of his judgment for the manufacturing of those styles, in order to get at least a limited number of sample pieces from each of them. In the meantime, perhaps his selling agent is selling more and more, and other styles, at a later period. At the same time the machinery is occupied on those previously entered, all of which must be gotten out of the way before any new or later orders can be put in, and with a hurried and short season, with orders entered late, there can be but one outcome—the last orders will be obliged to be overlooked. The loss by this to the trade must be incalculable.

Mr. Wood did not know how this trouble was to be overcome, but stated that the starting point for the correction of the evil was an earlier selection by the buyers, in order to give the mills at least two months' more time than they do to-day. As it is now, the trade, perhaps unconsciously, but nevertheless arbitrarily, fix the deliveries upon their sample pieces, and not the mills. It is a pity, he said, that the trade can not see this; it is a pity that they do not themselves start earlier, so that in turn they may give the manufacturer that time so necessary to produce the goods, which in turn will enable the merchant to do a larger business and satisfy his particular trade, instead of this harassing and vexing condition of things, which nothing but earlier orders can prevent.

A mill agent of one of the largest mills in this country, Mr. Wood reminded, has said that one-half of the orders that go into the mill die before they reach the machinery, on account of the unreasonableness of buyers in expecting a delivery which the machinery can not perform.—*Daily Trade Record.*

One hundred and forty-six thousand four hundred persons are dependent upon the textile mills of North Carolina for a livelihood.

ELECTRIC DRIVE FOR COTTON MILLS.

Advantages of an Electric Drive.

by J. K. W. Davenport.

Part I.

The early development of electric drive for cotton mill service was confined almost exclusively to plants in which the prime movers were water wheels. The first developments in this country were brought about by the fact that water powers owned by cotton mills and located at some distance from the mills, could best be utilized by installing electric generators at these plants and transmitting the power electrically.

All the early applications in textile mills tended toward the installation of units of some size, and synchronous motors seemed to be the type of apparatus best adapted for the service. It was not for several years after the first installation that the use of induction motors of the smaller sizes was thought of and carried out.

The advantages claimed for an electric drive, which have been substantiated by the writer, are as follows:

1. Simplifying of the plan of the buildings and their construction, by which considerable saving is effected in their cost. The mill may be at a distance from the power, thus making it possible to locate the mill buildings to greater advantage. In explanation of the above it is necessary to call attention to the fact that in the case of a mechanically driven mill it is necessary to provide a rope or belt way in the mill building, which is generally located at the center, thus taking up practically one complete bay or 25 feet throughout the whole height of the building, with the possible exception of the fourth floor. This space that must be provided for the driving of the mill is a fire menace to the building, and also tends to darken the floor space on both sides of the way. It also adds materially to the expense of the building, inasmuch as it is required by the insurance companies that this space be practically isolated from the rest of the building and it is therefore necessary to construct it as a well with solid brick walls extending three to four stories, depending upon the height of the mill building. It is also necessary to have this construction heavy because of the great weight of head shafting, counters, etc., that must be carried. With the mechanical form of drive, it is absolutely necessary that the power plant be located adjacent to and form a part of the mill building. This has caused many bad layouts from an engineering standpoint. Had engineers in the past had at their hand a system as flexible as electric drive, there is no doubt that many of the cotton mills in Fall River, New Bedford, and many other large manufacturing centers in the East would have been located very differently.

In order to keep the mill building close to the power plant in many cases it was necessary to put the mill under deep embankments where the water wheel was the prime mover, and as the plants extended and the water powers were used up, stream plants were put in as auxiliaries and this kept up the old location with further disadvantages of long transmissions of power by means of shafts and belts. Any one who ever visited Fall River can not help seeing what a great advantage it would be to the manufacturing interests if it were possible for them to receive their power from a central electric station and to locate their mill buildings so as to give them outlets and inlets for their freight. In Fall River, New Bedford and many of the eastern manufacturing cities, the mills are required to dray practically all their coal, as well as their raw and finished material, which adds a great expense to the cost of manufacture.

A central power plant system would have done away with this; and the mills could have been located adjacent to the system of transportation which serves them and undoubtedly could have obtained their power at a lower cost than at the present time.

2. A reduction in the size of the line shafting and the driving belts. This is also a saving in first cost of no inconsiderable amount. No shafting larger than 3" is used in the case of the electrically driven mill and that size only for shafts that support driving pulleys. The largest driving belt in most of these mills is 6". This fact is an important one, as it is only necessary to cite the well-known mechanical principle that power is consumed in moving weight to illustrate the saving that is effected by reducing the size of shafting and belting. Another great advantage of the electrically driven system is that it is possible to arrange the drives so that not all of the shafting is rotating in the same direction without resorting to crossed belts. Shafting for a given department can also be arranged at right angles to that of other departments without having to resort to quarter turn drives which are great consumers of power. The fact that some of the shafts are driven in one direction and some in the other materially reduces the vibration of the mill building and therefore adds to the life of the same.

3. A reduction in the friction load, due to the use of small shafts and belts by which a smaller percentage of power is used in friction losses.

4. A more flexible distribution of power throughout the mill, by which an accident to one line shaft will necessitate the shutting down of only a minimum amount of the machinery. Machines may be operated in separate buildings without using a drive that is exposed to the weather.

5. Any motor with its complement of machines and shafting may be run without any other part of the mill being in operation. This effects a saving during the first starting up of the mill, while only a part of the machinery can be operated, also when one department has to be run overtime, when the other departments are idle. This power is also of particular advantage where the Draper or other automatic looms are used, as it has proved practicable to run the looms during the dinner hour without any other part of the mill being in operation. This is not only an advantage to the mill, but also to the help who are paid on the basis of "cuts."

6. An increased production of manufactured material due to the steadier running of the motors, each motor being only remotely connected with those driving other parts of the mill. It is consequently very slightly affected by throwing on and off such heavy machinery as openers and pickers. The advantage gained by more steady speed is one that does not appear so strongly to an outsider, but this is one of the greatest advantages that result from the adoption of the electric drive. The action of varying speeds in the case of the mechanical driven mill is more nearly comparable to the operation of alternators in parallel than to anything else that the writer can think of. It has been found that in some of the older mills, where the speed of the prime mover varied perceptibly that this was multiplied

in going from shaft to shaft until the increase when the machine was reached was so great that in the case of speeders and slubbers the front rolls would be thrown out of their bearings and the product thus affected. This is even more detrimental in the case of looms where the revolutions per minute mean picks per minute. If the picks per minute are not maintained constant the quality of the cloth is bound to vary. It has also been found in some of the older mills that the various countershafts proceeding from the main line shaft run at different speeds so that it was impossible to keep help satisfied that were operating machines toward the outside of the building because the speed of the machines at that point was not the same as those close to the main driving shafts. These points were not discovered by the mill managers until the electric drive brought them out. The faults were rectified by changing the sizes of the driving pulleys.

Induction Motors.

Each Motor of 20 H. P. Driving Four Spinning Frames, Furnished by the Crocker-Wheeler Co., Ampere, N. J.

Another great advantage under this head is the possibility of noting by means of recording wattmeters the exact results that are being obtained in various departments of the mill. Twelve-hour charts showing the load conditions throughout each day's run for each department can be easily kept, and the superintendent or overseer can immediately tell from the reports what is being done by the various departments. In one mill where an electric drive had been installed for about ten years a wattmeter of this kind was attached to a motor driving a short line of shafts; and it was found that the power was excessive for the load. An examination was made of the buildings and the shafting and it was found necessary to reline the shafting and rebabbit the boxes. After this was done another test was made which showed that the power had been decreased about 50 per cent. This one test was of sufficient value to pay for the meter equipment in one year, in power saved. The whole mill was then tested, department by department, or motor by motor, and it was found that savings could be effected throughout the mill. In the case of mechanical drive the power can be measured only at the engine, and then the result is shown only by means of indicator cards. This result is far less valuable than the results that can be obtained by means of diversified tests. In most electrically driven mills it is the practice to have an individual circuit from the main switchboard to each unit of 100 to 200 h. p. capacity, and where two or three smaller units are taken care of they are on the same circuit. In most cases it is the practice to install indicating wattmeters on these circuits and the station attendant can tell at any time the exact condition of operation of any department or of any particular motor.

7. A minimum repair account. It has been found that the steadier the machines run there is a material saving in the cost of repairs, especially to looms. This is a very evident fact since anybody who has had any dealings with rope or belt driven mills appreciates what a task it is to keep large belts or a great number of ropes in shape so that they will properly do their work. Where ropes are used it is necessary to keep an experienced splicer at the mill and where belts are used experienced mechanics must be employed to keep up the heavy belts. Where the electrically driven system is properly installed, in the beginning the repair costs for maintenance are very slight. The writer was personally in touch with fourteen mills and endeavored to obtain from the managements of these mills statements as to the cost of maintenance. The mills that gave the most satisfactory results were those in which induction motors were used. It is a safe statement to make that the repairs for the motor equipment will not be more than 2 per cent. per year of the cost of the equipment, and may not reach even that amount. From the figures which the writer has been able to obtain he has been led to believe that this cost will not exceed 1 per cent.

A MILL SHOULD ESTABLISH AN IDEAL.

In order for any mill to produce fabrics of the best quality and that will always run even, so that a buyer can depend on them, it must have the co-operation of its employees and provide conditions so that those employees can do their best. In other words, a mill must establish an ideal, and then if it decides that the best efforts of its employees are necessary in order to reach that ideal it must plan to bring out that quality in the work of its operatives.

There is one mill in Rhode Island (the Hamlet Textile Co., Woonsocket, R. I.), which has achieved an enviable position in mill circles and in the market for its goods, although having to overcome handicaps seemingly insurmountable, which would have been thought practically beyond the bounds of possibility within the short space of three years within which the feat has been actually accomplished. So radical has been the change made in the old cotton mill that one can hardly recognize the original structure in the modern equipment of the present plant. This has all been brought about by establishing an ideal, and gradually and steadily working up to it, having confidence that the persistent following of correct business principles will command success for any mill's product.

During the three years in which the remarkable results have been attained the management has kept before itself and its help the one word, "Uniformity," and in every part of the mill this has been worked for. In order to get the best of help it has been made possible for them to earn big

wages, and then everything that it has been possible to do, so that they would be stimulated to produce the best work and the greatest amount of it, has been done.

There are numerous little things about a mill that managers do not ordinarily consider important, but many of them if changed would save labor, at the point where it will count both for employee and employer. In any successfully managed mill these features are plainly evident.

In a gathering of the employees of the Hamlet Textile Co., held recently, at which the governor of the State and other notable personages were present, the menu card bore the following mottoes:

"Uniformity the Watchword.—Every employee should aim to produce the most and best. The company aims to provide every facility.

"Use No Machine Out of Order; Report Immediately.—Perfect machinery, intelligent operation, eternal vigilance, perfect work. The company provides the machines.

"Cleanliness Is Next to Godliness.—Cleanly and healthful surroundings contribute to the comfort and happiness of employees; their appreciation is best shown by maintaining the standard. Best results are obtained by good discipline and harmonious co-operation."

The one feature that stands out prominently in connection with this mill is that the management believes that before you can get the best out of employees you must provide such conditions as will make it possible for them to live up to your desire.

Classification by a salaried board of expert classers having no other interest in the cotton business; such board to grade cotton only.

The creation of an improved board of appeals.

Improved arbitration of irregular and staple cotton.

The compulsory use of the official standards of the exchange by the board of classers.

The identification of individual bales by grade, on the face of the grade certificate.

The adoption of a strict good ordinary clause, or its equivalent.

Perpetuation of the commercial or market grade difference system, as always enforced at New Orleans.

The exclusion of all low grade tinged and stained cotton from the grades tenderable on contract.

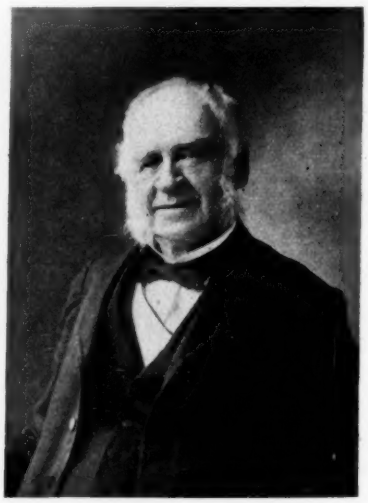
In no sense does the adoption of the grade certification system constitute or imply "fixed differences."

CHARLES L. HILDRETH.

Charles L. Hildreth, for twenty-five years superintendent of the Lowell Machine Shop, Lowell, Mass., and identified with that concern for over 50 years, died at Westford, Mass., February 26, at the advanced age of 85 years, having been born October 9, 1823 at New Ipswich, N. H. He moved to Lowell in 1845, and became an apprentice in the Lowell Machine Shop, which was incorporated the same year. After a service of three years he became a contractor on piecework in the shop. In 1858, during a depression, in the textile machinery trade he moved to Philadelphia and served as a foreman in the Industrial Works. In 1860, he returned to Lowell and became a foreman in the Lowell Machine Shop, being advanced to the position of superintendent in 1879.

In 1905, Mr. Hildreth retired to his country home at Westford (a typical New England village nine miles from Lowell), which he had carefully designed and prepared for spending his declining years after a long, active and useful business career. This home had been in the possession of his ancestors for several generations. He had been in ill health for several months, having received a fall resulting in a fracture of the collar-bone, from which he never fully recovered. At the time of his death he was calling on a

Residence of Charles L. Hildreth, Westford, Mass.



Charles L. Hildreth.

IMPROVEMENTS IN FUTURE CONTRACTS.

Action of New Orleans Cotton Exchange.

The New Orleans Cotton Exchange has adopted a resolution providing for changes and improvements in its future contract and future rules all of which are fully endorsed by the United States government and by the legitimate interests in the cotton trade.

Among the more important changes effected are:

The adoption of a system of certification of grades, carrying with it the official guarantee of the exchange and the permanent identification of each and every bale.

neighbor after his daily walk. He complained of feeling ill and expired before medical aid could be secured.

Mr. Hildreth was a member of the Society of Mechanical Engineers, and a regular attendant of the Kirk Street Church at Lowell. He endowed a church in the village at Westford and took much interest in all local affairs. He was closely identified with the Lowell Textile Schools, hospitals, savings banks and other public institutions in Lowell. He traveled extensively both in this country and Europe. In 1846, he married Mary M. Lovejoy of Nashua, N. H., who died December 1, 1889. Two children were born, Emily Francis, July 11, 1847, and Ella Francelia, December 12, 1849, the latter having made her home with her father.

The funeral of Mr. Hildreth took place at Westford, March 2, the services being conducted by Rev. Chas. P. Marshall of the Kirk Street Church, Lowell; interment at the Lowell cemetery. A. G. Cummock had charge of the funeral arrangements. The pall-bearers were from his associates at the Lowell Machine Shop—Frederick A. Flathers, Edward N. Burke, Channing Whittaker and Chas. C. Hedrick.

Mr. Hildreth was identified with the textile machinery trade during almost the entire period of its development in America, many of the most valuable improvements being the results of his ingenuity and tireless efforts. He was in close touch with hundreds of manufacturers of textiles throughout the country who will learn of his passing away with deep regrets.

CHILD LABOR LAWS.

NORTH CAROLINA.

All efforts to change the labor laws of North Carolina, affecting the employment of children in manufacturing establishments, have met with defeat at this year's session of the legislature. The law that was enacted in 1907, therefore, remains in force to the following effect:

No child under twelve years of age shall be employed and no child between the ages of twelve and thirteen years of age shall be employed, except in apprenticeship capacity, and only then after having attended school four months in the preceding twelve months. Not exceeding sixty-six hours shall constitute a week's work. No boy or girl under fourteen years old shall work between the hours of 8 P. M. and 5 A. M.

ALABAMA.

The law of this State affecting child labor has the following provisions:

No child under twelve years of age, shall be permitted to work in or about any mill, factory, or manufacturing establishment. No child between the ages of twelve and sixteen years shall be employed unless such child shall attend school for eight weeks in every year of employment, six weeks of which shall be consecutive. No child under the age of fourteen years shall be employed for more than sixty hours in any one week. No child under sixteen years of age shall be employed between the hours of seven o'clock P. M. and six o'clock A. M. standard time, and no child over sixteen and under eighteen years of age shall be so employed between said hours for more than eight hours in any one night.

In relation to the foregoing law, the Alabama Cotton Manufacturers' Association, at one of its recent meetings, passed the following resolutions to show the attitude of its members towards its enforcement:

"Whereas, the child labor law of the State of Alabama having been under serious discussion at a meeting of the cotton manufacturers of the State, and

"Whereas, the fact of this meeting may have created the impression upon the minds of some that the manufacturers had combined to combat said law, be it hereby

"Resolved, that the association wishes to set at naught such rumors or impressions and to have it known that it is in no wise antagonistic to such law, but on the other hand the cotton manufacturers of the State of Alabama, members of this association, will not only obey but uphold and endeavor to strengthen same and comply with its provisions to the best of their ability and according to the conditions prevailing in the various localities."

THE SPINNING ROOM.

I have read good articles which called the card room the stomach of a cotton mill. Why not call the spinning room the legs? First, because there are a lot of legs or samsons to the spinning frame, and, second, the boss spinner will have to use his legs in keeping after 10 or 20 thousand little spindles making yarn.

Now, all spinning rooms will take spells of running badly, and even some never do run well. The thing for the overseer to know is what makes his work run bad, and be sure to lay the trouble where it belongs, then apply the remedy.

I have seen overseers in sizing up their yarn, go through the room and pick a bobbin here and there to test its weight and strength, when the roving frame from which the yarn was made might have been spun two or three days before, lying in the card room or on top of the spinning frame. The only way is to weigh the roving fresh from the speeders, and if it needs changing do it in the card room. By doing this one can keep up with his work; because if his yarn falls off in strength he will know by the time the roving gets in all his spinning frames, say two or three days, his work will not run as good as when his yarn is spinning up to standard. That would give him time to look around for anything that was going wrong, or be ready to put in more twist if the cotton was of shorter staple.

There is a lot of little things to look after in the spinning room which one can only learn by practical experience. Leather rolls should be kept clean at the ends so they can run free. In fact, everything must be kept clean or one's work will not run good.

I will close by asking a question. Can you make a better grade of yarn, say No. 50, by taking off the back saddle on a spinning frame, and have no weight on the middle roll? Presuming 1¼-inch staple cotton is being used.

TRAVELLER.

Good dressing, bleaching and dyeing are essential to the production of a good finish and every department in a works has a share in the final general good appearance of the cloth when it is sent out. A good manager is always careful to watch each of the various processes the cloth goes through and to see that all preliminary operations are well done, for no matter what skill or labor is expended on a nappy, badly bleached, or streaky dyed piece it never looks well.

COTTON MANUFACTURING

THE MAKING OF A THREAD.

THE RING DOUBLING AND TWISTING MACHINE. NO ADVANTAGE IN HAVING A TOO LONG LIFT. ADVANTAGE OF A QUICK LIFT.

BY SAMUEL WARD.

First Honors Silver Medalist and Clothworkers' Company Prize. Lecturer in Cotton Spinning.

PART IV.

A description will now be given of the ring doubling or twisting machine, and as this machine finds the most general adoption a more detailed description will be given.

This type of twisting machine bears a general resemblance to the ring spinning machine. The same principles in regard to twisting and winding are involved in both machines. There are, however, three essential points of difference:

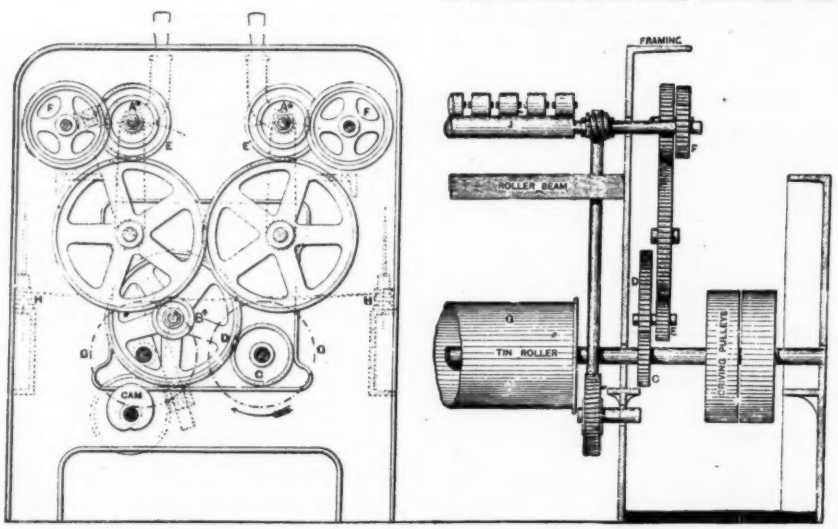


FIG. 13.

1. There are no drawing rollers, because yarn so well twisted can not be drawn, as previously explained.
2. The type of bobbin mounted in the creel is different.
3. The type of bobbin built on the machine is usually different, as in many cases the bobbin is supplied with two flanges or "heads," although in certain cases—when the doubled strands are being twisted without water—it is not unusual to make the bobbins exactly the same shape as the spinning machine, viz—similar in build to a cop.

Fig. 13 is a cross section of a ring doubling machine which will convey a general idea of the construction.

As in the ring spinning machine there are two rows of spindles, one on each side of the machine. These are driven from the tin cylinder by means of endless bands as shown. Motion is given to the single line of feed rollers by the tin cylinders through the train of gear which connect these. This machine is usually constructed with three points for changing the twist which are provided on account of the wide range of twists put into the various doubling.

It will be noticed from the diagram Figs. 8 and 9 (February issue, page 147) and 13, that the building mechanism is driven from the bottom line of feed rollers through the medium of the worm, worm wheel and heart cam. The revolution of this heart cam depresses the lever L, Fig. 9, which has connected to it the chain operating the lifter rail, the manner in which this is performed being further illustrated in Fig. 14, which is a side elevation of the same machine. The levers E are arranged to lift both sides of ring rails at once, being suitably counterpoised with balance weights to prevent any inordinate strain.

A good working length of machine is from 32 to 36 feet long, 600 spindles, made up generally of four sides of 150 spindles each, is a good average number for a doubler to attend to. If frames are too long the lifting shafts are liable to torsion—if chain lifts, and the strain during the upward change of the lifting motion causes rapid wearing of hearts and bowl studs which has the effect of laying an undue amount of yarn at the bottom of the bobbin, whilst at the top change there is a corresponding dropping of the ring rails. Another objection is the straining of the long tin rollers, and last, but not least, is the necessity of using wide heavy belts which are liable to fly off the pulleys. No advantage is gained by having too long a lift in ring doubling frames because of the varying degrees of tension under which the traveller is driven between the extremes of top and bottom lift. The advantage of a 6" lift holding a proportionately greater length of yarn over 5" is more than counterbalanced by other evils which do not exist in the flyer twisting machine where the flyer eye is always at the same distance from the thread eye in the thread boards. In addition, a 6" lift takes longer to fill, and the rings—towards the end of a set—become hot and dry. The friction of the travellers wears all the lubrication off the ring.

Three types of bobbins are produced on these machines —one is built similar in shape to a cop, and two other shapes are shown in Fig. 15.

A is a bobbin with two heads, the top one being of less diameter than the bottom.

B is not provided with a top head.

During the building of *A* or *B* the lifter must be suitably accelerated about one inch from the top, so that less yarn is permitted to be wound on at this point.

The first type referred to is used exclusively for yarn twisted without having passed through water, or as it is styled "dry" doubled.

A is used for the coarser yarns and *B* for the finer yarns. In the case of *A* the actual traverse of the yarn on the bobbin should be 1/16" to 3/16" less than the distance between the heads of the bobbin, according to whether the counts are fine or coarse and as to whether the lift be quick or slow.

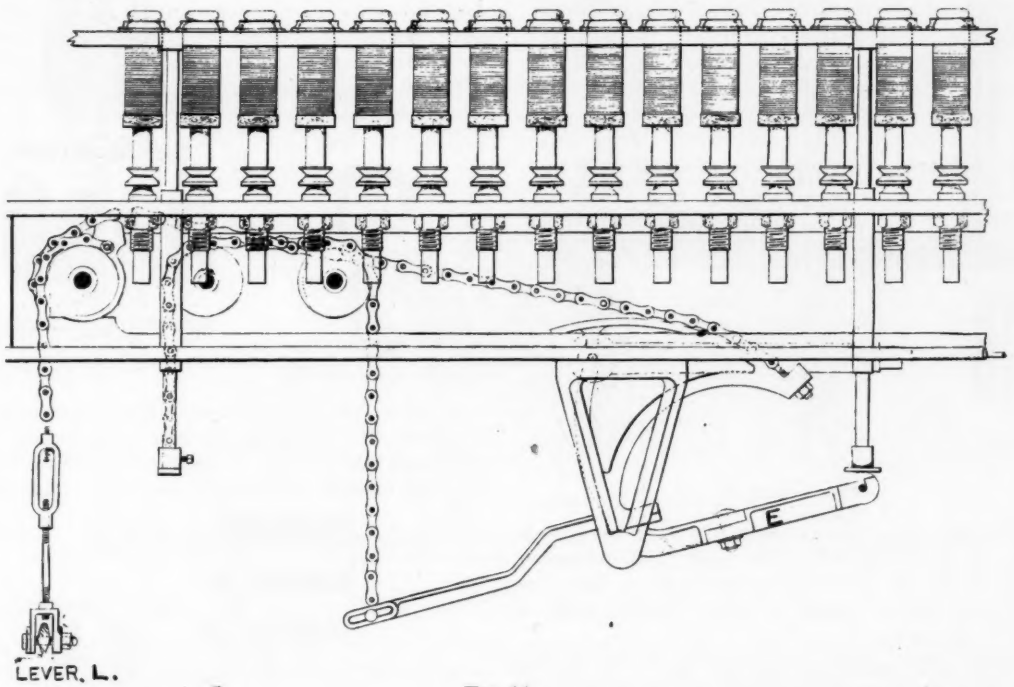


FIG. 14.

A slow lift is advisable for fine counts and the traverse of a slow lift should be relatively short, in other words a quick lift may traverse a little more to fill the bobbins than a slow one.

The reason for making the bobbin *B* thus is to permit of the yarn being unwound from the end at the next process, with as great a speed as possible without the tension and risk of breakage due to a large top head.

The spindle *C* is shown in section and it will be seen that its construction is on the gravity principle.

At *D* it will be observed there are two projections which fit into a corresponding slot in the bottom head of the bobbin, and by this means the bobbin is positively driven.

In Fig. 16 is shown a plain view of a bobbin base illustrating further the method of driving.

At *E* is shown a knee brake against which, as its name suggests, the knee is pressed when it is necessary to stop the spindles for the purpose of tying an end. The surface in contact with the spindle whirl is covered with leather.

Twisting spindles, as will readily be imagined, are made much heavier and stronger than spinning spindles on account of the greater strength of the yarn and weight of the bobbin when filled with yarn. This necessitates more power for driving and therefore stronger bands. The difficulty of keeping these at work is increased by the tightness with which these are set to work, consequent upon the shortness of the driving. This evil is very considerably modified by driving two opposite spindles, i. e, one spindle on each side of the machine with the same band. This method has several features to commend it to a practical mind, amongst which are:

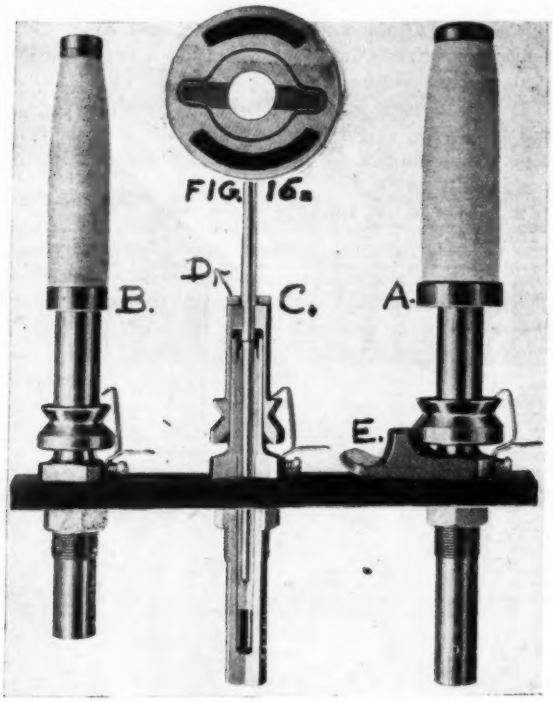
1. The band is more than twice the length of the one used for driving single spindles, which admits of the band being set to work at less tension, which increases its life considerably.
2. There is less variation in the twist.
3. The driving is more positive on account of the bands encircling the tin cylinder instead of passing half-way round only.
4. The band approaches the spindle whirl in a straight line on each side of the machine, and full advantage is obtained of the smallest diameter and the maximum speed is then obtained.

In Fig. 17 is given a sketch of the kind of ring and traveller used for "dry" doubling which it will be seen are the same as those used on the ring spinning frame.

Fig. 18 gives a sketch of the type of ring and traveller used for "wet" doubling. These it will be noticed are both different in shape, the traveller especially being much stronger, for obvious reasons.

In the former case it is usual to oil the top edge of the ring to prevent the heat generated by the traveller, burring the traveller off on the one hand and extracting the "temper" of the ring on the other.

In the latter case, however, a special grease is used, which has to be placed on the inside of each ring just before or immediately after each doffing, for the reasons named above, and in addition the prevention of the rings from being rusted by the water thrown off from the yarn. This practice incidentally introduces a rather serious evil, as when an end breaks it lashes the grease of its own ring, not only upon its own bobbin and staining this, but upon its next neighbors, staining them also.



Figs. 15 and 16.

If the lift is too slow so much more yarn will have to be run off into waste before the greasy part disappears, whereas if the lift moves moderately quick so much less stained yarn will be needed to be run off into waste, to get rid of the stain.

Another advantage of a quicker lift is that the ring plates do not dwell too long at the bottom change and cause the ends to balloon and knock against each other whilst the maximum length is suspended between the thread guides and travellers.

Doubling creels are constructed according to the requirements of the work to be done, the commonest type of all being the "porcupine" creel (see Fig. 19, upper left hand corner). It consists mainly of two rows of wood rails on each side of the machine, to which are fixed iron pegs for the reception of bobbins or cheeses from the winding frame one bobbin to each spindle—the threads already having been doubled on the winding frame. The upper and lower pegs are not placed exactly one over the other, but so that the yarn from the upper bobbins will always run clear between the surfaces of those on the lower rail. As the thread comes off on the left hand side of the bobbins the proper position of the top and bottom pegs is exactly opposite the right hand cap bar, beginning at the left and continuing at each alternate cap bar from left to right.

The size of the bobbins is only limited by the distance between the pegs, which usually admits of the bobbins a little less in diameter than twice the guage between the twisting spindles.

An additional height of wood rails and pegs is used where especially large spools are required in the creel such as in the production of the very coarse counts or yarn requiring a few turns of twist only. This permits of the spools being spread over a greater area, and, therefore, a much larger spool can be used.

The size of spools used for fine yarn is decided by the strength of yarn of which they are composed, as this must bear the strain of pulling the spool round in the creel.

Figs. 17 and 18.

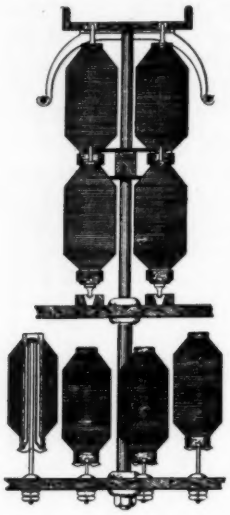


Fig. 21.

Another type of creel is one which can be used in the production of six cord yarns, such as sewing thread, netting yarns, and twines. Indeed in the case of the latter it is not unusual to have a twelve height creel, similarly

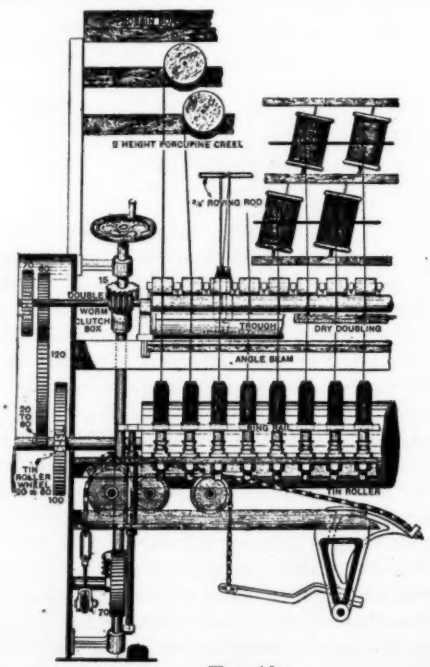


Fig. 19.

constructed. In the absence of a stop motion it is obvious that this type of creel assumes for its success, yarn which does not break, and a drag nicely graded for each strand, otherwise it is inevitable that considerable risk is run.

In the case of netting yarn where the folds to be doubled into one strand often number 27 or even higher folds, this type of creel is more or less imperative.

The material first of all passes through the preparing doubling frame two or three strands together, as suits the requirements, and the bobbins, thus produced, are either placed in the doubling creel direct, or the yarn wound on to winding frame bobbins which in their turn are taken to the finishing doubling frames.

To prevent large knots and lumpy places in the yarn, care must be taken, when an end fails, to piece the same up to its own strand and not bunch two or more strands together. If this point be observed the knot is twisted into the doubled thread and is, therefore, almost imperceptible.

A much better and safer way to make a six-cord thread, is to first wind two strands together at the winding frame. These are twisted together at the first or preparation doubling frame. The resultant yarn is taken again to the winding frame to wind three of these doubled strands on to one bobbin or cheese after which they receive the requisite twisting at the finishing doubling frame.

CONCENTRICITY OF RINGS AND SPINDLES IN RING FRAMES.

BY JAMES WINTERBOTTOM.

It is acknowledged in respect of the essentials in ring spinning that none contribute more towards the efficient working than that of concentricity of rings and spindles.

Makers of these machines all emphasize the care they bestow in making the parts which are involved in obtaining the above-named condition, also the care required in setting those parts.

There is no doubt that the work of setting the spindles and maintaining the concentricity of spindles and rings receives the most careful consideration of all spinning overlookers. Yet, in spite of these precautions, it is found that a very high percentage of spindles and rings are not concentric throughout the lift, and this often to a considerable extent. There are many difficulties bearing upon the condition in question, and those having the greatest influence are: The making of ring rails so that when fixed they are, and remain, true for every spindle; the making of the various parts of the spindles so that they are, and remain, in correct alignment with the traverse of the rings. These conditions obviously mean that all spindles must perfectly align with each other, and with the traverse of the ring rail,

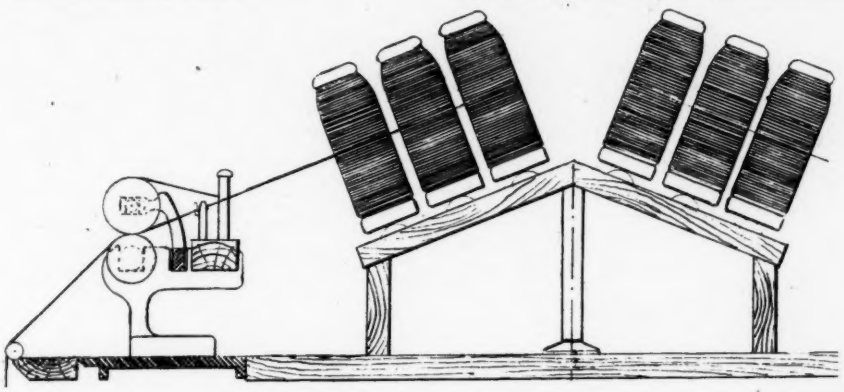


Fig. 20.

In Fig. 20 is shown a desk creel used for the purpose of twisting yarn direct from the bobbins of the preparation doubler, in the process of finishing.

In Fig. 21 is shown a creel suitable for knitting yarns which are usually made from coarse three or four hank rovings. These rovings are harder twisted, that is double the usual quantity of twist is put in to give the requisite strength to the roving for pulling full bobbins round at the next machine. The creel is three height, lower stages, often double, set out zig-zag in footsteps allowing two ends per spindle, one each side, upper rows are single only, one end to each spindle, making altogether four folds. This type of creel is also suitable for double spinning, a process to be described subsequently.

In Fig. 12 A (February, page 149) is shown a combined creel for cops and bobbins to be used alternately as desired. This type of creel is often used in conjunction with double troughs or troughs of double width, say 8" wide, and the yarn is thus thoroughly soaked. This arrangement is supposed to have the effect of drawing out "snicks." The drag-board *D* can be swivelled to allow of more or less drag.

and remain concentric with their respective rings. To get some idea of what this means with one spindle, it is necessary to consider the number of the contact surfaces which are involved, and each of which must align when in position. When the number of those surfaces is multiplied by the number of spindles in the ring frame, the obstacles presented to the machinist and involved in accomplishing the spinning manager's ideal, "the production of the best yarn at the highest speed and without waste" are only partially discerned.

Non-centricity of rings and spindles at any point in the lift wields a detrimental influence, the effects of which are always most acute when the ring rail is in its lowest position. In setting ring spindles almost every fitter has his own particular method. Of these the most common seems to be to use a disc slightly smaller than the ring. It is bored to fit upon the spindle at some point in the lift. The exact point at which the disc fits the spindle is varied. Some fitters prefer one fitting at a point opposite the bottom, giving as their reason that first stated in this paragraph. Others favor the disc fitting at the top, but most give preference to a point at above midway in the lift. In starting up a

ring frame the spindles are provisionally secured "within the ring" and when banded the machine is set to work, and they are then re-adjusted with spindles running.

Owing to the tendency of the spindles to creep when screwing up the bolster nuts, hammering into position by the aid of a brass drift is a common practice. When this work is completed satisfactorily the bolster nuts are then made as secure as possible. To prevent disturbing the setting at this latter stage, it is useful to employ a cramp lever to securely hold the spindle bolster whilst screwing up the nut.

Sometimes a conical iron disc and tube are used in preference to the plain disc. The outer edge of the former fits the ring, and that contains a straight bore, of a size that enables it to fit over the tube, with just sufficient clearance to be free. The tube fits the full length of the spindle blade. When the disc is in position in the ring if the latter is not concentric the disc binds upon the tube and prevents its free movement with the spindle. Adjustment of the spindle to give freedom of the tube within the disc secures the desired effect. Setting can be done with the ring rail at any part of the lift. A very simple and effective method of reducing this tendency of the spindle bolster to creep, practiced by a Continental fitter, is that of having the bolster nuts exceedingly slack fitting upon the thread. To obtain that condition it is necessary to "chase" the screws, but makers deprecate the slack fit which it requires. Although this is deprecated by makers, there is no doubt about its efficacy, and this also without impairing the holding powers of the nut in as far as the work required of it.

Another equally simple and effective procedure enables the spindles to be secured perpendicular, and this also is not usually regarded with favor. It consists of using fine rolled cartridge metal, cut into straight strips and also in mitre shape. These are made from several thicknesses of metal, suitable, according to that found necessary to "pack" or "line-up" the spindles. They are placed between the bolster and the top face of the spindle rail as packing to "throw" the spindle perpendicular, a straight strip being used for the side or front, and a mitre for the diagonal effect. The adoption of this last-named system enables the spindles to be satisfactorily and readily adjusted at the bottom and top of the lift. In order to accomplish this successfully, with each spindle, it is necessary to use two discs, these being made to fit the spindle at points opposite the top and the bottom positions of the ring rail.

To test the setting it is expedient to disconnect the ring rail in sections, each section is then rendered perfectly balanced, so that it may be raised and lowered smoothly and easily, and by the person engaged in making the adjustments. To accomplish this latter it is necessary to provisionally support the lifting levers whilst the chain operating the first lever is disconnected to prevent the ring rail from dropping. This may be accomplished by first tying up the lifting rods. Then balance weights are placed so that the ring rail is sufficiently balanced to enable it to be easily moved by applying hand pressure at the ring rail and of its remaining stationary. Such movement is further facilitated by tying up, or otherwise fastening, all the lifting rods excepting those of that section in which the setting is being done, the latter being balanced by the weight adjustment provided for that purpose. By this means it is possible to move the ring rail at the point of adjustment through the full lift of the ring rail, and it will remain at rest wherever desired, so that the efficacy of the packing and of the adjustment of the parts may be tested with perfect ease. The setting is thereby accomplished in a most satisfactory manner without materially adding to the cost or time that is usually taken to accomplish this work in the ordinary way.—*Textile Recorder.*

SETTING OF DRAFT ROLLERS.

BY V. P. H.

One of the most important points in regard to carding and spinning machinery is the proper draft to use, that is, the adjustment of the different rolls to each other according to the special requirements in each case.

No ironclad rule can be given respecting this matter. I once held a position where the card room was being pushed to keep up, and before going there the mill had 3,000 spinning spindles stopped for roving. The mill was making 40s out of seven-hank roving and the first thing I did was to change to a 6.25 hank, and the 3,000 spindles were all going in two weeks' time and plenty of roving to spare.

Too great a draft will jerk the yarn too much and have a tendency to be uneven, which can never be remedied in any of the processes to follow. On the other hand, a deficient draft will not be as economical as it should be. About 12 to 13 should be the limit on double roving and not over 8 1-3 for single roving for spinning, although this is exceeded at times, but is not generally advisable.

Improper setting of rolls is of vital importance and should receive special attention. The bad work that will result from the improper setting of rolls can never be remedied. In setting rolls there is one broad principle that must always be followed, viz.: The distance between the center of each pair of rolls must always exceed the average length of the staple of cotton used. If this were not so the fibers would come under the action of the forward pair of rolls before they were released by the preceding pair, and since the speed of the rolls increases at the front this would break the fibers.

Aside from the length of staple being used there are several other things that should be carefully considered in setting rolls. Rapidly revolving rolls require wider settings than those having slow speed, since with a slow speed the rolls can be set closer and still the fibers be given sufficient time to be drawn away from the mass of cotton without being strained.

From this statement the conclusion should not be drawn that since the front pair of rolls turns faster than the back rolls, the front rolls should be set farther from the middle rolls than the back rolls, for this is not so, as other circumstances oftentimes overbalance the speed of the rolls. Since the speed of the rolls increases with each pair, that is, those nearer the front of the machine, the cotton strand, as it passes through the rolls, is greatly diminished in size.

For this reason we space our rolls farther apart at the back than at the front. For example, if the staple on a draw frame is one inch the distance between the front and second pairs of rolls might be 1¼ inches, between the second and third pairs 1⅜ inches, and between the third and back pairs 1½ inches. The heavier the roving or sliver the wider the settings should be on drawing, slubber and intermediate frames.

The following settings for 1-inch staple is a good one for medium counts where heavy sliver is made, say 68 or 70 grains for yarn of about 30s.

First drawing: Front and second rolls 1 7-16 inches; second and third 1 5-8 inches; third and back 1 5-8 inches.

Second drawing: Front and second rolls 1 3-8 inches; second and third 1 5-8 inches; third and back 1 5-8 inches.

Slubbers: Front roll speed 164 r. p. m. Front roll and second 1 1-4 inches; second and third 1 3-4 inches.

Intermediates: Front roll speed 144 r. p. m. .58 hank. Front and second rolls 1 3-16 inches; second and third 1 5-8 inches.

Roving frames: Front roll speed 116 r. p. m. 1.62 hank. Front and second roll 1 1-8 inches; second and third 1 9-16 inches.

Spinning: Front roll speed 126 r. p. m.; 5 hank roving. Front and second rolls 1 1-16 inches; second and third 1 -3-8 inches; spinning 30s yarn.

Each case of roll setting must be judged by the special requirements or circumstances, as stated at the beginning. For ordinary setting for a lighter sliver, say 60 grains, I would use at the drawing 1 1-4 inches, 1 3-8 inches and 1 1-2 inches with some cotton of 1-inch staple.

Breaking Weight of American Warp Yarns, Per Skein, Weight Given in Pounds.

Number.	Breaking Weight.	Number.	Breaking Weight.	Number.	Breaking Weight.	Number.	Breaking Weight.
1		26	66.3	51	36.6	76	25.8
2		27	63.6	52	36.1	77	25.5
3	530.0	28	61.3	53	35.5	78	25.3
4	410.0	29	59.2	54	34.9	79	24.9
5	330.0	30	57.3	55	34.4	80	24.6
6	275.0	31	55.6	56	33.8	81	24.3
7	237.6	32	54.0	57	33.4	82	24.0
8	209.0	33	52.6	58	32.8	83	23.7
9	186.5	34	51.2	59	32.3	84	23.4
10	168.7	35	50.0	60	31.7	85	23.2
11	154.1	36	48.7	61	31.3	86	22.8
12	142.0	37	47.6	62	30.8	87	22.6
13	131.5	38	46.5	63	30.4	88	22.4
14	122.8	39	45.5	64	30.0	89	22.2
15	115.1	40	44.6	65	29.6	90	22.0
16	108.4	41	43.8	66	29.2	91	21.7
17	102.5	42	43.0	67	28.8	92	21.5
18	97.3	43	42.2	68	28.5	93	21.3
19	92.6	44	41.4	69	28.2	94	21.2
20	88.3	45	40.7	70	27.8	95	21.0
21	83.8	46	40.0	71	27.4	96	20.7
22	79.7	47	39.3	72	27.1	97	20.5
23	75.9	48	38.6	73	26.8	98	20.4
24	72.4	49	37.9	74	26.5	99	20.2
25	69.2	50	37.3	75	26.2	100	20.0

Draper Co.

Cotton is the leading textile paper in the South.

WOOL MANUFACTURING.

THE USE OF COTTON IN THE WOOLEN MILL.

The Selection and Mixing of the Stock.

by O. F. Ireland.

Part II.

In the combination of wool and cotton, the finer qualities of wool always give the best results. Where coarse wool is used there is a greater difficulty in securing a uniform and perfect mixture.

As fibers of about the same size make the most perfect blend, and the cotton fibers are always fine, with but slight variation, it becomes necssary to select the wool to match the cotton.

The use of coarse wool in the mixture results unfavorably in various ways: The mixture can not be made as uniform, either in the picking or the carding; and, if the wool is very coarse, it will be impossible to set the cards so as to do justice to both kinds of stock; and in the spinning the bad work may be intensified by the slipping of the cotton away from the wool fibers, resulting in uneven and twitty yarn. Then again, there will be a rawness in the appearance of the thread, which will be more especially noticable in a mixture of two or more contrasting colors.

It must be borne in mind that the number of wool fibers are reduced in proportion to the coarseness of the stock, and it is the lack of fibers that gives the raw appearance to the yarn.

The finer wool gives a multiplicity of fibers that results in a better mixture, more perfect yarn and a more woolly appearance to the finished cloth. In determining upon the wool stock, the fulling capacity should be carefully considered, as in the fulling process the undesirable "cottony feel" is overcome in proportion to the quality and perfection of the felt produced; and it is here again that the multiplicity of fibers counts for good results in the finished fabric.

In the consideration of this subject, we can not overlook the advantage sometimes gained by the introduction of shoddy as a part of the wool stock; for it is often the case, in figuring for a low-priced cloth, that its use is the only means of solving the problem. It is a mistaken idea to suppose that because shoddy is to be used, "any old thing" will do. The same care should be exercised regarding quality and fulling capacity as in the selection of the wool.

To illustrate the advantage of a combination of the three kinds of stock, we will give the particulars of a case where we found it desirable. We were asked to make a cloth at a specified low cost, to meet a special demand. We found upon making calculations, we must get up a mixture not to exceed 29½ cents per pound.

The stock we had to use cost as follows: Wool 58 cents, shoddy 18 cents, and cotton 16 cents.

Now to make a mixture of the wool and shoddy that would come within the cost limit, would necessitate the following combination:

Wool, 28½% at 58 cents	=16.53 cents.
Shoddy, 71½% at 18 "	=12.87 "
Total,	29.40 "

This mixture, though within the limit, was out of the question, because it was impossible to make the yarn sufficiently fine, (3½ and 4 runs) from stock containing 71½ per cent. of short stock.

Turning to a combination of wool and cotton, we found it must be as follows:

Wool, 32% at 58 cents	=18.56 cents.
Cotton, 68% at 16 cents	=10.88 "
Total,	29.44 "

Here we had a mixture that would make good strong yarn, but with more than two-thirds cotton, which would not make a desirable fabric, as it would be too cheap and "cottony" in appearance when finished.

Now by combining the three kinds of stock we overcame both difficulties, got good yarn and a very creditable fabric.

This we accomplished as follows:

Wool, 30% at 58 cents	=17.40 cents.
Shoddy, 35% at 18 cents	= 6.30 "
Cotton, 35% at 16 cents	= 5.60 "
Total,	29.30

The chief advantage of this mixture is, that it contains 65 per cent. of stock that goes to give the cloth the appearance and "handle" of a wool fabric, while it contains only 30 per cent. of really expensive stock. This was the only solution of the problem, and we could not have used any more wool stock; for the addition of more shoddy would have made it too tender, while the wool would have made it exceed the cost limit.

In mixtures containing contrasting colors, it is best to put the cotton in the color that predominates. For instance, if the mixture is to be composed of 75% white and 25% black, use white cotton; and if it be an Oxford mix, or one where the black is a predominating color, then use black cotton. It is a good rule to avoid as far as possible the use of cotton in the colors that give character to the mixture; but always have it correspond with the ground color of the mixture. In mixtures where the colors are about evenly balanced, as black and white of 50% each, it is best to divide the cotton equally between the two colors. In mixtures having small percentages of bright colors for illuminating effect, as red, orange, green, &c., these colors should always be of wool stock, because they should possess a brilliancy which can not be retained on cotton through the finishing process.

On account of the difficulty of getting certain colors on cotton that will hold their fulness in the finishing, it is sometimes advisable to use an entirely different color of cotton. A navy blue, for instance: In cotton it is apt to present a dull slatey effect after it has undergone the fulling, and often a good bright blue wool slightly on the light side of the shade desired, may admit of a mixture of black cotton, and when it is finished, the result be more satisfactory than to use a blue cotton with the attending danger of washing out. In fancy colors used for decorating, plaiding, &c., it is usually advisable to use all wool to insure the desirable brilliancy. It is better to use a little larger percentage of cotton in the body of the cloth, if necessary, in order to do this.

When it is convenient to do so, it is sometimes better to vary the percentage of wool in the warp and filling, in favor of the latter. What we mean is, if it is desired to make a fabric of 25% cotton, and a soft woolly effect is wanted, it may better be attained by putting 30% of cotton in the warp, and only 20% in the filling. If the warp and filling are about balanced in weight, the average percentage is as required, and two advantages are obtained: First, the additional cotton in the warp helps to strengthen it, especially if there is a percentage of shoddy in the mixture; and secondly, the additional wool in the filling will greatly increase the fulling, and a better felted and softer fabric will be the result.

There is another way the mixture may be varied to advantage. Where goods contain quite a quantity of white yarn, it is is a good plan to increase the percentage in that, and use less cotton in colors that are especially liable to "go to pieces" in the finishing.

The writer once made a line of light weight cassimeres composed of a mixture of forty per cent. cotton and while they were very creditable goods, the darker solid colors, as black, brown and blue, lacked the fullness of shade that was desirable, on account of the cotton washing out. There was no complaint regarding the goods, and the orders exceeded our ability to supply.

The following season we were asked to duplicate the fabric. This we did, but varied the mixtures, in hopes of attaining better results. About half the yarn used was white, and this we changed to fifty per cent. cotton and reduced the percentage in the dark colors to thirty and thirty-five per cent.; making our calculations to keep the average about forty per cent., as the previous season. The result was very gratifying, as the darker colors were improved by the increase of wool, and there was less tendency to bleeding and running of colors, and the white was rendered even whiter by the added percentage of cotton. There was an improvement in the clearness of the fabric and much less danger of trouble in the finishing. Of course changes of this kind can not be safely made in the middle of the season; but must be determined upon in getting out the samples, so as to have uniformity.

We would not lay down any arbitrary rules, the idea being to thus improve the colors that are liable to "flatten out," and make the safer color carry more cotton to keep the cost of the cloth within bounds.

BLENDING OF COTTON AND WOOL.

PROCESSES OF MANIPULATING WOOL AND COTTON DIFFER FOR THE TWO FIBERS.

BY JOSEPH H. BARKER.

PART III.

The machinery used in the preparation, carding, and spinning of wool, and the conditions necessary for its successful operation, are necessarily much different from those obtaining in the manufacture and treatment of cotton.

Cotton is operated in the dry condition in which it is received from the plantations, and under suitable treatment in the scutcher and carding-engine its filaments are easily separated from each other without much damage or deterioration. There is no matting or felting of the fibers to contend with as there is in wool, which even as it is received from the back of the sheep is almost always more or less matted; a condition which is generally somewhat increased by the washing to which it must be subjected, and which makes the opening and separation of the locks and fibers in the subsequent operations more or less difficult; and it is necessary in order to facilitate the separation of the fibers without breaking them to freely lubricate the wool with oil, before passing it on to the carding process.

It is assumed that it is generally known that in the manufacture of woolen goods which are made from a mixture of wool and cotton, woolen machinery is used, and the woolen method of treatment pursued; and there is,

therefore, the less necessity to enter into a detailed description of cotton machinery and cotton methods, as it will be necessary to refer only to one or two cotton machines. It may be pointed out that, in operating cotton, the general end aimed at is the arrangement of the filaments in parallelism with each other; the ultimate object being to produce a thread of perfect evenness in thickness, and generally of relative bareness or freedom from loose fibers on its surface. This, however, does not apply with equal force to all descriptions of cotton yarns, particularly to some of those which are spun for use in certain branches of the woolen trade, in which case a more or less woolly thread is an advantage, as it assists in preserving the relative positions of the two kinds of thread—the woolen and the cotton—after being woven, by reason of the entanglement of the loose fibers of each. When exceptional evenness and bareness is required, the cotton is not only carded, but combed, and the short and broken fiber is separated from that which is longer and more perfect, and a stock of approximately uniform length of fiber is secured, from which the most perfect yarns may be spun.

In the production of woolen yarns, whether they be composed entirely of wool or of a mixture of wool and cotton, the object aimed at is quite the reverse. Parallelism of the fibers is neither desired, nor attainable by the woolen method of treatment. The kind of thread which is desired is the characteristic woolen thread, in which both ends of every woolen fiber project from the surface of the thread, like plush, while the intermediate portion of each fiber finds a place in the body of the thread and gives compactness, solidity, and strength to it.

Wool, by reason of the curly and wavy character of its fibers, lends itself admirably to such an arrangement; but the cotton fiber, by reason of its fineness and straightness, assumes both in the scribbling and spinning processes, the longitudinal direction, with more or less parallelism of the filaments, and becomes embedded more in the body or heart of the thread than on the surface, and in that position, both by its length and strength, gives consistency, solidity and strength to the yarn. The curly wool fibers become arranged more or less crosswise, and by interlacing with the straight cotton filaments, and also with each other, are found to be mainly upon the face of the thread, and give to it, its woolly or plushy character and appearance.

There are many conditions to be taken into consideration in operating these two and different kinds of fibers in combination, some of which may now be noticed.

Experience has demonstrated that what are known as "firm cards"—cards set in a thick cloth foundation—are the most suitable for carding cotton. In some districts, such cards are also used for carding wool. This can be done when the wool is sound, fine, and fairly uniform in length of fiber.

For carding tender wool, however, and for shoddy and mungo, and other short and tender material, experience has demonstrated that what are known as "kind" or pliable cards give the best results, and are most suitable. In performing their work, they do not forcibly tear the fibers apart, but rather, as it were, gently coax them to separate from one another, returning again and again to matted or entangled locks or threads until the fibers are separated; and thus the length of fibers, which is often short enough already is preserved, and the best result obtained.

Cotton, unless it be mixed with a suitable percentage of wool, can not be successfully and satisfactorily carded on the woolen scribbler. The action of the strippers and fancies would disarrange the parallelism of the filaments, not to mention other objections which do not apply to the subject under consideration.

Cotton, too, by reason of the fineness and straightness of its filaments, lies low upon the surface of the cylinders, and rollers or plats, as the case may be, in the carding engine, and can only be carried forward by maintaining a sharp point on the cards, and by close setting or adjustment of the carding surfaces.

On the other hand, in the carding of wool on the woolen scribbler, the conditions are quite different, and by reason of the wavy and curly character of the wool fiber, the filaments appear more conspicuously above or upon the card surfaces, and are more easily arrested and caught by the opposing surfaces; and consequently it is not necessary either to set the carding surfaces so close together, nor to have so fine a point on the wire as in the cotton carding engine.

Furthermore, after the cards of a woolen scribbler have been once properly ground, and the various cylinders and rollers (particularly the strippers and fancies) have been properly set, they act in a gentle way, as grinding rollers, to grind them again. If the strippers and fancies be properly set, they act in a gentle way, as grinding rollers, and produce and preserve exactly the proper kind of point on the swifts, the workers and the doffers; and grinding with the emery roller is not necessary. The card point most suitable for carding wool, is not a sharp needle point, but a blunt, round and smooth point; and such a point is both produced and maintained by the strippers and fancies. The management of the cards on a woolen carding engine on which tender wool and mungo, etc., are to be scribbled, demands great skill and nice judgment; and these, only close observation and long experience can give. Upon such cards, with such a point, and adjusted or set in such a way, it would be next to impossible to scribble raw cotton—alone.

In order to insure that the cotton, in any given blend of wool and cotton, shall be as well opened, and its fibers as perfectly separated from one another as the wool fibers are required to be, it is desirable that, before being blended with the wool, it be first prepared on cotton machinery.

In the case of cotton fly, and cotton waste which has been opened on a waste opener, the desired condition already exists; but it is otherwise in the case of raw cotton,—conditions which are not suitable for wool, but extraneous matter always to be found in raw cotton; and it should, therefore, be scutched and carded on a cotton card, before being mixed with the wool.

If the cotton be so prepared, and brought into a loose and fleecy condition previous to being blended with the wool, the wool carding overseer is relieved from any necessity of setting his cards close, or of grinding them to a sharp needle point for the purpose of "touching" the cotton,—conditions which are not suitable for wool but which are detrimental and injurious to it,—but may confidently set his cards in that way which is best adapted for operating the wool; and the already prepared cotton, being open, light and fleecy, will be carried along, as it were, with the wool, from cylinder to cylinder, becoming continuously, and at the same time, all the more perfectly mixed with the wool.

If, however, the cotton be not previously prepared in the manner indicated, the carding engineer is compelled, in order to properly (and even then only imperfectly) card and open the cotton, not only to put a sharp, keen, point on the cards, but to set them so close in order that he may "touch" (operate) the cotton, that the wool in the blend will be broken, ground and injured to the detriment of the blend as a whole.

There is also another point of difference in the conditions necessary for the successful operation of the two kinds of fiber. The temperature most favorable for operating cotton, is much higher than that required for wools. Cotton is most successfully operated at 70 to 80 F., whereas wool is generally carded at a temperature 10 to 15 degrees below that, which is another and important reason for first carding the cotton by itself in a room of the proper temperature and humidity.

Further, it should also be remembered that cotton has a great affinity for oil, but does not card freely if it be saturated with it, and consequently it is carded in the dry condition when it is carded alone. Wool on the other hand is always scribbled "in oil." To scribble it dry would inevitably result in its fibers being more or less broken, and its average length being materially shortened, to the general deterioration of the blend; and consequently it is always oiled in the preparing process,—receiving from 15 per cent. to 20 per cent. of oil, or possibly a little more, when it is to form part of a blend of wool and cotton, which should properly be all absorbed by the wool before the cotton is mixed with it.

For that reason, in a blend which is to consist of wool and cotton, it is manifestly advantageous to first mix the wool, shoddy, mungo, or other waste without the cotton, and apply the oil to that portion of the blend alone, which should then be teazed, and the oil be thus thoroughly wrought into and among the wool; which should then be allowed to stand "in oil" for a time sufficient to allow of the oil becoming thoroughly absorbed by the wool before the cotton is mixed with it; otherwise the cotton will absorb a considerable proportion of the free oil, which it does not require; and the wool will to that extent be deprived of oil which it does require.

Even under those conditions the cotton still absorbs some of the oil from the saturated wool; hence the desirability of giving the wool a little more oil than it actually requires, in the preliminary blend, as already mentioned.

Such preliminary mixing is all the more necessary if a portion of new wool be included in the blend, because in that case the wool will not previously have been oiled, and will require more time to thoroughly absorb the oil put upon it; but in the case of shoddy, mungo, etc., these will be already more or less saturated with oil, and the cotton can not absorb any material quantity from them; but of unabsorbed oil, not only on the wool but also on the mungo, etc., the cotton would quickly suck up and absorb the greater part of the free unabsorbed oil, and thus rob the wool of that which is necessary for its proper lubrication, and charge itself with that which would interfere with its own proper treatment, by causing the straight filaments to become stuck together and sodden with oil.

KNITTING

WHEN IS HOSIERY YARN BAD?

THE LANDING OPERATION CAUSES THE LEAST TROUBLE. LITTLE TROUBLE AT THE CAST-OFF UNLESS THE YARN IS TENDER. A PICK-UP. THE PERSONAL ENVIRONMENT. ADAPTATION OF GAGE AND SIZE OF YARN. FLEECE KNITTING.

BY ERNEST TOMPKINS.

PART III.

Fig. 5 shows the progress of the new loops and the old stitches after leaving the sinker and while they are being manipulated by the lander and the cast-off. It will be remembered that while the presser holds the beards closed into the eyes of the needles the old stitches are raised up over the points of the beards, which operation is called "landing," the bur performing it being called a lander, and after that the old stitches are cast off the heads of the needles, the operation being called "casting off" and the bur performing it being called a "cast-off."

On the left of the drawing is a large wheel pressing the cloth down behind the needles. This is the push-down. In front of the lower portion of the push-down and outside of the needles is a small saucer shaped wheel pressing against the needle beards. This is the presser. Under it the old stitches will be observed coming up on the shanks of the needles. The points of the lander blades are observed projecting through the needles and inclined upward toward the reader. These lander blades raise the stitches up and leave them on the points of the beards. Further to the right are the cast-off blades resembling those of the lander, but projecting farther through the needles. In considering the quality of the yarn the landing operation does not require much attention. Indeed, of all knitting operations it is one that probably causes the least trouble, provided, of course, that the lander is properly designed for the work which it has to do. The most frequent trouble at the lander is caused by the blades punching through the cloth instead of lifting it up. This may happen if the lander is not adjusted sufficiently low or if the stitch hugs the needles too tightly. The latter may be caused by a heavy place or a kink in the yarn, either of which might load up the needles to such an extent that the lander blades could not move them up on the needles, in which case the blades would punch through the cloth making a long ragged hole.

At the cast-off, comparatively little trouble occurs unless the yarn is tender, in which case the blades may cut holes. It is true that a kink or a heavy place in the yarn may not be cast clear of the heads of the needles, in which case the needles are sprung outward by the pressure of the blades against the heavy places or kinks. This bending as a rule is not permanent so that the needles resume their alignment. The trouble comes, however, when the heavy place or bunch or kink reaches the next feed. When it comes to the push-down the obstruction is likely to remain in the heads of the needles, instead of being pushed down

on the shanks as are the normal stitches. If a clearing bur is used, as is generally advisable, the obstruction will be pushed down by the clearing bur blades. This bur is not illustrated in any of the drawings, but it is a bur somewhat resembling the cast-off placed on the outside of the needles just ahead of the sinker. It pushes down out of the heads of the needles any obstructions which are not moved by the push-down. If these obstructions "stay put" low down on the needle shanks they will probably pass under the blades of the sinker and over those of the lander and cast-off, probably being entirely cast off at this second feed. On the other hand if the obstruction is a kink —although a clearing bur will put it down on the needles— the loop end of the kink may twist upward into the blades of the sinker but causing what is called a "pick-up"— one of the most damaging accidents that occurs with a loop wheel knitting machine. It is damaging because the kink can not be pulled up entirely owing to the fact that the push-down is holding it on the inside of the needles. Consequently, the sinker bur is pulled back violently, and thus over-reaches and smashes the needles.

So far, the yarn and the machine have been discussed without much consideration of the personal surroundings, but in knitting, as in many other things, the personal environment produces unexpected complications. It would take too much space to treat this phase of the matter fully so that only a brief outline is given. The knitting room of a modern mill is in some respects, like the vermiform appendix of the human body; that is, trouble may be expected there at any time and it may be very serious if not attended to promptly and properly. Unlike the appendix, however, the knitting room can not be cut out. The likelihood of trouble in the knitting room will be understood somewhat from what has already been related, especially bearing in mind that all of the work of the knitting operation and feeding the yarn is transmitted through the needles, which are flexible and delicate. Moreover, a lot of bad blades, a lot of bad needles, a batch of poor needle metal— for most of the machines under discussion use leaded needles —any or all of these may be distributed through the knitting room and may be in use for some time before the defects develop and then the development may be so rapid as to put the room almost out of commission. A lot of bad help may do as much havoc as all of these other troubles combined. If added to this a lot of bad yarn comes into the room the conditions becomes serious indeed. It can be conceived then how it is that boss knitters like musicians reserve the right to be nervous. Moreover, they are, as a class, independent. Since the knitting machines are so easily put out of order the boss knitter who can keep them in order is a desirable man, and of course, realizes it. If then the goods are not coming through the knitting room properly and a complaint is made, there is the inclination to make that troublesome reply: "Get another man." Consequently, in not a few knitting mills there is no free exchange of opinions between the boss knitter and his superior. If under such conditions the knitter states that the yarn can not be run there is a natural tendency on the part of his superior to give the knitter the benefit of the doubt and to give the yarn to the spinner. On the proprietor's side, if he has bought his yarn at high prices and then has to reduce the price of his goods because quotations on yarn have gone down, and it should happen that the knitting room is not running very well, would he be anything but human if he did not conclude that the trouble arose from defects in the yarn and that he ought to return it and buy a new lot at a lower price? It should be said, however, in justice to a large proportion of boss knitters and knit-goods manufacturers that they are above taking undue advantage of the spinner. Indeed, it may be safely ventured that the knit-goods manufacturers sustain more loss in knitting poor yarn than they impose on the spinner by rejecting questionable yarn.

Attention has been called to the fact that the yarn may be too heavy for the gage of the machine on which it is used, or that the stitch may be unusually tight. The spinner might ask: How is it that the knitter does not get the right count of yarn for his machines or the right gage of burs and needles for the yarn? There is some reason in this question because the domestic knitting machines are susceptible to change of gage at far less than the original cost of the machine, which is not the case with foreign

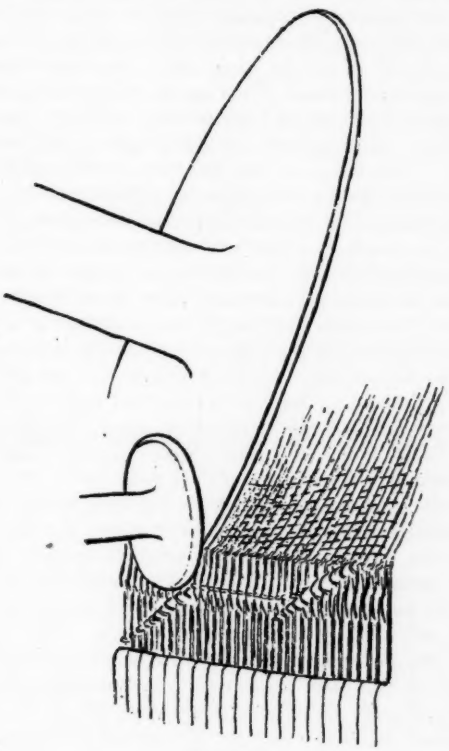


FIG. 5.

knitting machinery. Nevertheless, if the knit-goods manufacturer has purchased a few changes of gage he concludes that he has more money tied up in knitting machinery than he likes, so he tries to get along without any more changes. If he were in Europe he would placidly buy new machines for every different gage and diameter until he had an acre or so of them. The American knitter not only fails to appreciate this, but sometimes thinks it is surprising that the manufacturer of knitting machinery is not willing to exchange new burs for old. Suppose then that a knit-goods manufacturer has purchased as many changes of gage as he cares to get; then his salesman brings in a garment and tells how many cases of those he can dispose of if they are duplicated as to weight and general make-up. The weight of the yarn is determined, a sample lot is procured and the knitter makes a roll of cloth lengthening the stitch

or shortening it, as the case may be, in order to duplicate the fabric in the sample. This cloth is made up into garments and orders are taken even though the knitter may have remarked that his equipment is not the right one for that yarn and stitch. The proprietor naturally thinks what man has done man can do, and the opportunity of scooping a lot of business and selling the mill up quickly is not to be disregarded. The salesman is as good as his word so the mill is flooded with orders. A large lot of yarn is purchased and the necessary number of machines is put on the work, perhaps all of them; but if the yarn is not exactly up to the sample or possibly if it is up to sample or even superior it may cause trouble in the knitting because the sample lot of yarn undoubtedly had the personal attention of the boss knitter, whereas in the regular course of manufacture this atttention can not be given to every machine. Where a few weak places or heavy places or kinks may not have drawn attention on the one machine there is possibility of their drawing marked attention from the aggregate of all the machines. The proprietor wants to deliver the goods and it is too late to change his machinery. He may call for better yarn and be absolutely sincere in so doing. A comprehensive knowledge of the situation makes the requirements very clear; that is, the machines are being operated near the danger limit and in order to avoid danger the quality of the yarn must be superior to what would be required under safe operating conditions. The manufacturer does not impart to the spinner these minutiae of his business. Indeed, he may not comprehend them himself. Consequently, the spinner is entirely at sea. He may say truthfully that this yarn is used by other people. He can not see then why it is unsatisfactory here.

Up to this time the machine has been regarded as ideal, but even the best machinery is not ideal and the poorest may be far from it. It is a lamentable fact that some of the poorest is in operation. This fault is due to a virtue of the machine—its durability. The loop wheel machine is almost entirely rotary so that it does not pound itself to pieces like the loom nor wear in the grooves like the latch needle machine. The only essential wearing parts are the bur blades, the bur bearings, and the cylinder bearings, all of which are readily replaceable. Unfortunately, however, the replacement frequently ceases with that of the blades so that after a number of years the burs and cylinders get loose on their studs and run out of true. This decreases the safe range of the machine as far as weight of yarn and length of stitch is concerned and may decrease it to such an extent that there is no safe range at all except on very coarse gages. After one knit-goods manufacturer has allowed his machinery to get in this condition and has retired from business through choice or necessity, some other manufacturer will buy the knitting on the score that this type of machine never wears out or because it is just as good as he has and what he has is good enough. Now, the chances are that when the original owner started in business he had the idea that the best was none too good for him. This is an idea of youth which old age modifies. So after a time he bought second-hand supplies or other makes which were "just as good but cheaper" not knowing that the blades were a different shape and thickness and that the gage was off one or two per cent., and so on. However, when he finally disposed of the machines he had forgotten about the second hand or cheap supplies either honestly or with a mental reservation. The machines which he offered for sale were this, that, or the other "standard make." The purchaser naturally took his word for it. Indeed, he would have trouble disproving it because the fine points of the burs and molds and cylinders is not common knowledge. He may never know what hybrid machinery he has purchased. He will undoubtedly know after a time that everything is not going well in the knitting room. When that occurs he is sure that the yarn is the cause of it, because he can see no other cause.

Fleece knitting is done on the same principles as those already described except that a backing thread is laced in and out among the needles between two threads of plain knitting. For the backing yarn almost any material sufficiently strong to be wound may be used. As far as the knitting is concerned it may contain a considerable quantity of bunches and foreign matter since it does not go over the sinker burs nor under the needle beards. It is put into position by springing alternate needles back out of line and forcing the yarn down between the heads of the needles. It is not likely to contain kinks because it must be sufficiently soft to be broken up by the napping machine. The face yarn for fleece work is approximately half the weight of the yarn used in single thread flat work. Consequently, the requirements are not as exacting as far as kinks, bunches and other obstructions are concerned since there is a greater allowable margin for overload. This yarn, however, should be strong, because it must hold together during the same knitting operations as the heavier yarn used for flat work.

This discussion should have summary, but it is difficult to make a comprehensive one which will not have so many limitations and provisos as to make it too technical to be of value. The controlling conditions are so numerous and the combinations are so complex that practically speaking there is no general case. Indeed, as far as the defects in the yarn are concerned the criticism may be made that no new light has been thrown on the subject. Possibly, however, some light has been thrown on the conditions with which the yarn has to contend, and, knowing this, an intelligent spinner may be better prepared to meet those conditions than if he had no knowledge of them.

THE SEAMLESS FOOTER.

BY STEPHEN E. SMITH.

Part I.

In the seamless footing machine there are two devices which are necessary for the formation of the stitch. These are the needle and sinker. If the machine was knitting a piece of straight tubing without any pockets such as are required for forming the heel and toe, it would be possible by applying a take-up motion and using a cylinder with slots formed like those of the ribber cylinder, to dispense with the sinkers. As these machines are used, the sinker is just as necessary as the needle, and it really performs two offices, namely, holding the work down in place on the needles and assisting in forming the stitch.

Referring to Fig. 1, which shows a single needle and sinker, the following parts may be defined: *C* is the crown of sinker blade and serves to hold down the fabric while the needle is being raised through a new loop. The edge marked *F* comes against the yarn just after the needle reaches its lowest position (Fig. 3) and forces the loops back so that when the needle comes up again, it comes through the new

loop without being clogged by the old one. The edge *E* is the surface over which the loop is drawn (Fig. 2) and the depth to which the needle is forced below this surface is largely instrumental in regulating the length of loop, and, therefore, the fineness of the mesh. *B* is the butt of the sinker and is the part by which the cams cause the sinker to perform the work required of it. The sinker ring containing slots in which the sinkers slide, is mounted on the upper part of the needle cylinder, while the sinker cams are mounted on the under side of a cap which is held down on the ring by two clips. The ring is stationary but the cap and cams revolve, being driven by the dropper post (D. P. Fig. 6) through one of the adjusting screws *A*. This cap should move freely over the sinker ring, otherwise there will be trouble when the heel and toe are being made. This trouble is caused largely by accumulation of lint or dry bearings which cause the sinkers to move hard.

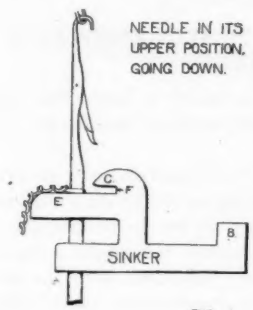


FIG. 1

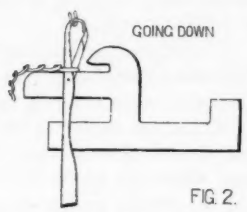


FIG. 2.

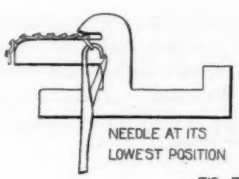


FIG. 3

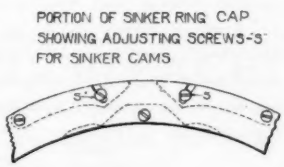


FIG. 5

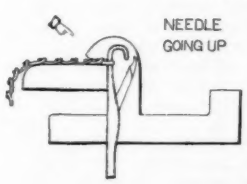


FIG. 4

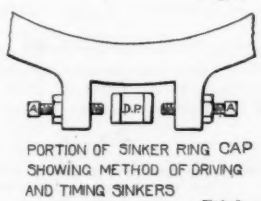


FIG. 6.

As the lint accumulates among the sinker blades in considerable quantities, great care should be taken to keep them clean and oiled so they will move freely. Cleaning can be done by using a brush similar in shape to a tooth brush but having longer bristles. A small amount of oil applied twice per day is sufficient. The frequency of cleaning would depend on the yarn—twice a day, once in the morning and again in the afternoon. The adjusting screws *A* are for timing the motion of the sinkers so that they will properly perform their work. This is done while the heel or toe is being made and head is reciprocating. As will be seen from sketches, 1-2-3-4, the sinker performs its part of forming the stitch after the needle does its part, and, consequently, the motion of the sinker must follow and never lead that of the needle. For this reason, some provision must be made for delaying the motion of the sinkers at each stroke of the head when making a heel or toe. This is accomplished by driving it as shown in Fig. 6. At the end of each stroke the sinker cams hesitate while the dropper post *D. P.* traverses the space from one set screw to the other, thus allowing the sinkers to fall into action behind the needles. In timing the sinkers, the cap is set by means of screws *A*, so that when the first needle of those in action is about in the position shown at Fig. 3, or not quite as low, the first sinker is just appearing between the second and third needles of those that are lifted out of action. This adjustment should be tried on both sides of the head. If timed too late, the sinker backs off from the stitch before the narrowing needle is thrown up out of action, thus allowing the work to rise slightly. If timed so they move too early, the crown gets in under the new loop and makes a very long one or the point of the crown strikes the yarn. In either case this may happen as the point of the crown is liable to strike the yarn that is being formed into the new loops.

The amount of motion of the sinkers in forcing the yarn back of the needles is regulated by the cams shown in Fig. 5, the position of which is fixed by the set screws *S*.

Although it is possible to increase the length of loop drawn, by forcing the sinkers farther inward, this should never be done. As the sinker does its work after the needle has drawn the yarn down over the sinkers, the loop can be enlarged only by subjecting the yarn to considerable strain which should in all cases be avoided if an elastic fabric is desired. Force the sinkers in just far enough to push the yarn clear of the needles and no farther, is a safe rule to follow.

STANDARD SCALE OF UNDERWEAR SIZES.

The standard scale of sizes for underwear recently adopted by the Knit Goods Buyers' Association, of New York, with the approval of the Wholesale Dry Goods Association, is as follows:

RIBBED.

CHILDREN'S.

Size mark—Age	2	4	6	8	10	12	14	16
Neck	11	12	13	13	14	14	15	15
Chest	18	18	19	20	21	22	24	26
Vest length	16	18	20	22	24	26	28	30
Sleeve length	11	12	13	15	16	17	18	19
Arm hole	9	10	11	12	13	14	15	15
Waist bands	23	24	25	26	27	28	29	30
Hip	23	24	25	26	27	28	29	30
Thigh	11	12	12	13	13	14	15	16
Rise band to crotch front	7½	8	9	9½	10	10½	11½	12½
*Rise band to crotch back	9½	10	11	11½	13	13½	14½	15½
Inseam	13	15	17	20	22	24	26	27
Trunk	37	40	44	47	51	54	58	61

WOMEN'S.

Size mark	34	36	38	40	42	44
Neck	16	16	17	17	18	18
Chest	26	28	30	32	34	36
Vest length	32	32	33	33	34	34
Sleeve length	20	20	20	20	20	20
Arm hole	16	16	18	18	20	20
Waist bands	30	30	30	32	34	36
Hip	32	34	36	38	40	42
Thigh	18	19	20	21	22	23
Front rise	14	14	15	15	16	16
*Back rise	17	18	19	20	22	22
Inseam	27	27	27	28	28	28
Trunk	62	64	66	68	70	72

BOYS.

Size mark—Age	6	8	12	12	14	16
Neck	13	13	14	14	15	15
Chest	20	21	21	22	24	26
Shirt length	20	22	24	26	28	30
Sleeve length	14	15	16	17	18	19
Arm hole	11	12	13	14	15	15
Waist bands	24	25	26	27	28	29
Hip	24	25	26	27	28	29
Thigh	10	12	13	14	15	15
Front rise	9	9	10	11	11	12
*Back rise	11	12	13	14	15	16
Inseam	17	20	22	24	27	29
Trunk	44	47	51	54	58	61

MEN'S.

Size mark	34	36	38	40	42	44	46
Neck	16	16	17	17	18	19	20
Chest	28	29	30	32	34	35	37
Shirt length	32	33	34	34	34	35	35
Sleeve length	20	21	22	22	23	23	23
Arm hole	16	16	16	17	18	19	20
Waist	30	32	34	36	38	40	42	44
Hip	30	30	31	32	34	35	37	39
Thigh	16	17	18	19	19	20	21	21
Front rise	13	13	13	14	14	14	15	15
*Back rise	17	17	18	19	19	20	20	21
Inseam	31	31	32	32	32	32	32	32
Trunk	62	62	64	66	67	68	69	70

INFANT'S.

Size mark—Age	A/0	B/1	C/1½	D/2	E/2½
Neck	9	10	10	11	11
Chest	14	15	16	17	18
Vest length	10	12	13	15	17
Sleeve length	7	8	9	10	11
Arm hole	7	7	8	8	9

FLAT.

CHILDREN'S.

Size mark—Age	2	4	6	8	10	12	14	16
Neck	11	12	13	13	14	14	15	15
Chest	22	24	24	26	26	28	30	32
Vest length	15	17	19	21	23	25	27	29
Sleeve length	10	11	12	13	15	16	17	18
Arm hole	9	10	11	12	13	14	15	15
Waist bands	23	24	25	26	27	28	29	30
Hip	23	24	25	27	29	32	34	36
Thigh	12	13	14	15	16	17	19	21
Rise band to crotch front	7½	8	9	9½	10	10½	11½	12½
*Rise band to crotch back	9½	10	11	11½	13	13½	14½	15½
Inseam	12	14	16	19	21	23	25	26
Trunk	37	40	44	47	51	54	58	61

WOMEN'S.

Size mark	..	34	36	38	40	42	44
Neck	..	16	16	17	17	18	18
Chest	..	34	36	38	40	42	44
Vest length	..	30	30	31	31	32	32
Sleeve length	..	19	19	19	19	19	19
Arm hole	..	16	16	18	18	20	20
Waist bands	..	30	30	30	32	34	36
Hip	..	40	42	44	47	50	53
Thigh	..	23	24	25	26	27	28
Front rise	..	14	14	15	15	16	16
*Back rise	..	17	18	19	20	22	22
Inseam	..	26	26	26	27	27	27
Trunk	..	62	64	66	68	70	72

BOYS.

Size mark—Age	..	6	8	10	12	14	16
Neck	..	13	13	14	14	15	15
Chest	..	24	26	26	28	30	32
Shirt length	..	19	21	23	25	27	29
Sleeve length	..	13	14	15	16	17	18
Arm hole	..	11	12	13	14	15	15
Waist bands	..	24	25	26	27	28	29
Hip	..	24	26	28	30	32	34
Thigh	..	14	15	16	17	18	19
Front rise	..	9	9	10	11	11	12
*Back rise	..	11	12	13	14	15	16
Inseam	..	16	19	21	23	26	28
Trunk	..	44	47	51	54	58	61

MEN'S.

Size mark	34	36	38	40	42	44	46
Neck	16	16	17	17	18	19	20
Chest	34	36	38	40	42	44	46
Shirt length	31	32	33	33	33	34	34
Sleeve length	19	20	21	21	22	22	22
Arm hole	16	16	16	17	18	19	20
Waist	30	32	34	36	38	40	42	44
Hip	36	37	38	40	42	44	46	48
Thigh	20	21	22	23	24	25	26	26
Front rise	13	13	13	14	14	14	15	15
*Back rise	17	17	18	19	19	20	20	21
Inseam	30	30	31	31	31	31	31	31
Trunk	62	64	66	67	68	69	70

Sizes on the rib scale are based on 1x1 stitch goods of winter weight and a stretch of 25 per cent. in width is allowed. This allowance may be increased up to 30 per cent. as the goods run lighter in weight, or decreased with more rigid fabrics.

* Where the front and back of pants are made alike they must both be the length of the back rise as here given, and not one-half the sum of the front and back.

"Waist band" is measurement of garment when buttoned.

A DEVICE FOR AUTOMATICALLY STOPPING A MACHINE.

The illustrations herewith relate to a mechanism for automatically stopping a circular knitting machine in case of defective work.

One of the main objects of this mechanism is to provide means for automatically stopping the knitting machine when any undue strain is brought on the needle cylinder.

A further object is to so mount the needle cylinder that it may have a slight rotary movement with the cam ring, when any undue strain is brought upon the needles; and to provide means whereby a slight movement of the needle cylinder will automatically stop the machine.

Another object is to so mount the needle cylinder that it will be capable of a slight movement under abnormal conditions, and to provide means whereby the movement of the needle cylinder will stop the machine.

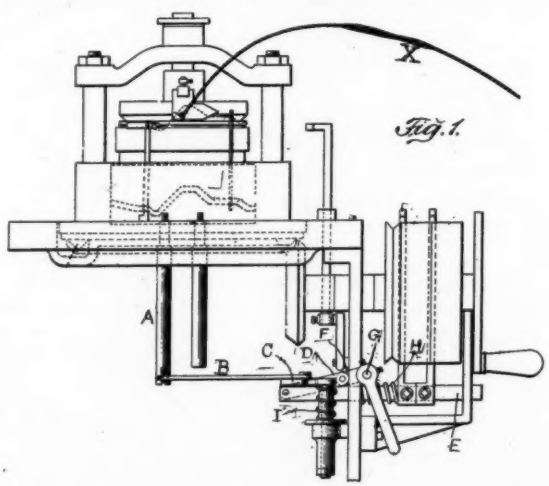


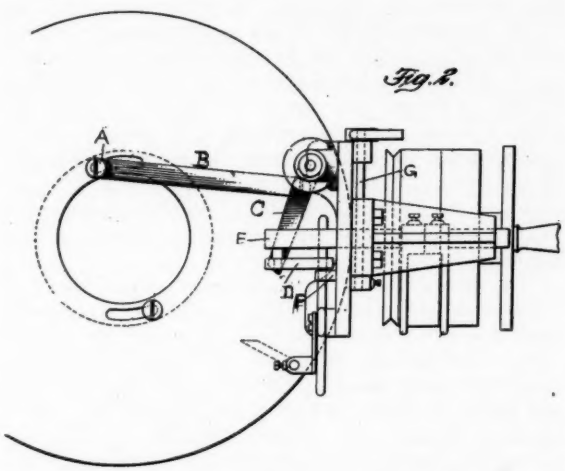
Fig. 1.

It is also an object to mount the needle cylinder so that it is capable of a slight rotative movement under abnormal conditions; and to provide a tension device to hold the needle cylinder stationary under normal conditions; and to provide means whereby when the cylinder is moved the machine will be stopped.

Figure 1 is a side elevation of a portion of a circular knitting machine showing the mechanism, and Fig. 2 a

bottom plan view of that portion of the machine shown in Fig. 1.

It is well known that in circular knitting machines of this general design the needles are easily and freely operated by the cam ring when the thread or yarn is of a uniform diameter, the needles having first been set to operate upon the desired uniform size of thread, but when the thread is larger in diameter than the size for which the needles are set, the needles operate stiffly and there is considerable friction in the cam ring which tends to drag the needle cylinder around with the needle operating mechanism.



When there is any considerable increase in the size of the yarn or thread it is desirable to stop the knitting machine in order to remove the defective portion of the thread. This binding of the needles in the cam ring is made use of, under these abnormal conditions, to operate a stop-motion, and to this end the needle cylinder is mounted so that it is capable of a slight rotary movement with the cam ring under abnormal conditions, means being provided to hold it stationary under normal working conditions. To accomplish this there is connected to the lower end of one of the studs *A*, one end of a link *B*. The other end of this link is pivotally connected to a horizontally swinging arm *C*, near the pivot thereof, whereby a slight movement of the link *B* will give considerable movement to the free end of the swinging arm. The free end of this arm is arranged directly over and close to the upper edge of the link *D* near the point of connection between this link and the reciprocating bar *E* of the belt shifter. The links *D* and *F* incline upwardly from the connection between the link *D* and the bar *E* to the rock shaft *G*, so that when the arm *C* is moved horizontally it will engage the upper edge of the link *D* and swing it downwardly, thereby moving the links *D* and *F* out of line and permitting the spring *H* to throw the belt shifter and thereby stop the machine.

Should there be any undue enlargement of the thread or yarn, as indicated at *X* in Fig. 1, the friction on the cam ring in forcing the needles to handle the thicker portion of the yarn will be sufficient to drag the needle cylinder with the cam ring to operate the belt shifter. It is also manifest that the strain required to move the needle cylinder may be varied by varying the tension of the spring *I*.

DYEING, BLEACHING AND FINISHING

CHEMICALS USED IN THE TEXTILE INDUSTRY.

Reported exclusively for COTTON.

We present herewith the first of a series of lectures on the chemicals used in the textile industry.

These lectures were delivered during the winter of 1908-1909 at the Kensington Institute of Philadelphia by Dr. Frederic Dannerth,—consulting chemist and chemical engineer—of that city.

Part II. will deal with the dyestuffs and the methods of dyeing.

Part III. will treat of the textile fibers.

Each part consists of twenty lectures, which will, together, form a syllabus of the textile materials.

The introductory remarks by the lecturer are in our opinion a sufficient justification for the publication.

CHEMISTRY.

PART I.

INTRODUCTORY REMARKS.

Aside from the many industrial changes in the way of improved machinery and processes which are generally accredited to the twentieth century there is one which bears directly on the chemical technology of textiles. I refer to the advent of the textile chemist in America. Previous to this time there were it is true a number of college trained men who had devoted their time to the study of the chemical problems of the textile industry but it was not until the close of the century that the textile chemists appeared as a distinct group. Here we have one more instance which goes to show how truly this is to be an "age of specialization."

In the early days the local pharmacist who frequently designated himself "chemist" was occasionally called upon to give advice concerning the various textile-chemical operations. In a limited number of cases we even find that doctors of medicine (physicians) were consulted. This will be more readily understood when it is added that the first men who taught chemistry at the universities were physicians. Then again there were foreman dyers who had read or rather "devoured" the meager treatises on chemistry at their homes in the evenings thus acquiring a better knowledge of the materials which they used. As time progressed and many of the large manufacturers realized the necessity for chemical control of their processes, the problems were referred to general chemists—those who analyzed iron and drugs, foods and fertilizers, paints and pottery.

As the pharmacist gave way to the educated foreman dyer and later to the general chemist we now find the field so extensive that only a specialist can intelligently cope with the complex problems which constantly present themselves.

In the faculty of medicine the idea of specialization has been developing for many years so that we are now quite accustomed to the specialists in diseases of the eye, the nerves, the stomach, the teeth and so on. Since the beginning of the present century the two leading textile schools of the country have offered courses in textile chem-

istry which leave little to be desired, but these courses can be pursued most profitably by men who have completed a four years' college course. In other words, the boy who takes up his technical studies immediately after leaving the high school will never possess that keen insight, that general survey of the field which a college trained man can acquire without much exertion. The practical effect which textile education has produced is that the "rule of thumb" and the empirical methods of our forefathers are rapidly giving way to advanced chemical engineering. The highest degree which the university confers on its graduates in chemistry is that of Doctor of Philosophy, but even this is of little value until the student enters the industrial field where he realizes the practical possibilities of his theories. His chemical philosophy attains its highest value when he is brought face to face with the technical processes and there sees the test tube reactions carried out on a manufacturing scale. The man who discovered the reason for the "red spots" on tin-phosphate weighted silks was a true philosopher, and the hundreds of chemists at work in the German factories preparing new dyes and medicines are not machines. Such things must be developed by reasoning.

To imitate that which has taken another man years to fathom does not require much thought. The modern manufacturer has discovered this and seeks to apply it by consulting a specialist even while his processes are apparently in good running order. His aim is to have his foreman add to his thorough knowledge of one process the experience which the consulting chemist has gained by coming in contact with many processes. A sample of soap may be analyzed by a boy with considerable accuracy but to interpret the analysis requires a broad knowledge of the processes for which the soap is to be used. In order that the consulting chemist may be of most service to the mill and incidentally to the foreman he must work with him and not against him. On the other hand the foreman who is so short sighted as to conceal the facts in the case only retards the work of the chemist, for intentional irregularities will come to the surface in any case. It will never be possible to replace the experience of a trained foreman dyer by an occasional consultation with a chemist. It should therefore be the aim of the foreman dyer to gain the confidence of the employer to such an extent that when the chemist is called in to criticize a process he will be able to do so in the presence of the foreman and not behind his back. Where this condition exists the chemist is welcomed rather than feared. The day has passed when a foreman would throw a handful of alum in a soap bath in order to show that the new soap is no good, on the contrary he is now busy attaining to the position to which he is by his training entitled. The result of all will be a standard of excellence to which none but the worthy will rise.

There is another side to this question which I desire to mention before closing these introductory remarks. It refers to the relation of science to the manufacturing processes. The statement has frequently been made that our manufacturers paid so much attention to the "cost of production" and the cost of their textile materials (fibers and yarns) that they entirely lost sight of the chemical materials used in their processes. It was this assertion, more than any other, which has suggested the value of a course of lectures covering the ground indicated. As the lectures are designed for manufacturers and for those who have little or no knowledge of chemical "theories" it will be necessary to frame the subject matter accordingly.

A booklet recently published by Watson Smith of London relates an incident in connection with the competition which the British hat manufacturers experienced about twenty years ago. The story bears such a close resemblance to our present undertaking that I feel impelled to repeat it at this time. "In the year 1887 a deputation of Manchester hat manufacturers, consulted Sir Henry Roscoe, then professor of chemistry in Owens College, Manchester, as to a remedy. This eminent gentleman advised the formation of an association and the appointment of a lecturer who was to deliver a series of lectures on the applications of science to this industry. The lectures were delivered with carefully prepared experiments illustrating the various processes. At the end of the course a patent by one of the younger members of the course became due and this proved to contain the solution of the chief difficulty of the British felt hat manufacturers." This interesting coincidence showed very clearly the wisdom of Professor Roscoe's counsel in advising a study of the scientific principles on which the industry rests. In the year 1906, Sir Henry wrote: "I agree with you that this is a good instance of the direct money value of scientific training and in these days of 'protection' and similar subterfuges it is not amiss to emphasize the fact."

The exact extent to which American wastefulness and "rule of thumb" methods are the product of a protective tariff is a matter which must needs be decided by the individual manufacturer. To refer once more to our great commercial rival—Germany—a close study will show that she has attained her present position not by the aid of educated capitalists nor by educated workmen alone, but by the simultaneous education of both the employer and the employed. Thus a proprietor is enabled to inspect his works personally and prevent a misuse of power on the part of his foremen. If a German works boast of employing the services of a chemist you may rest assured that the employee in question has received an accurate chemical training. The man who has learned merely the routine of laboratory work such as making a distillation or watching a set of dye experiments is not designated a chemist. Then again the proprietor of a dyehouse is very careful not to confuse his color mixer with his chemist, even though they are in many instances fitted to exchange places.

The course of lectures about to be inaugurated is intended therefore to be of benefit to the manufacturer as well as his employee. Reference will be made to particular processes wherever this may seem expedient, but the major portion of our time will be consumed in discussing the *chemicals* used in the various operations and the qualifications which they must possess in order to yield the best results. "Buying on specification" which plays so important a role in modern industrial economy will be referred to as occasion arises.

WATER.

Before turning to the consideration of the more complex substances used in textile processes we will dwell for a moment on that fundamental necessity for all chemical operations—water. Trivial as it may seem to the student of chemistry, the subject of water is one of vast importance to many industries among which may be mentioned tanning, beer-brewing and textile manufacturing. The chemical substance which he has learned to know as water appears to him as a compound of hydrogen and oxygen. One day spent in an industrial establishment will, however, show him how limited his knowledge for he soon finds that

all natural water contains more or less foreign matter. He thinks of the rain and snow as being pure water yet these have in their downward course carried with them suspended matter and any gases which may have been in the air at the time. The snow which has melted high up in the mountains appears in the valleys as an "upland surface water," —the rain which falls on the ground appears in the rivers as a "ground water" having percolated through the soil or drained over the surface. In other places the water has passed into the ground and come in contact with limestone and magnesite. These are the waters which appear when artesian wells are drilled. Thus we see that water may differ according to the influences to which it has been exposed. Rain and snow water is difficult to obtain,—river water may be muddy, more especially in stormy weather,—artesian well water will contain in solution the minerals with which it has come in contact. The one source which seems to offer the best water is a location near a mountain or in a mountainous country. An upland surface water so obtained has not yet come in contact with many impurities and has had little opportunity to dissolve lime or magnesia compounds. It is probably for this reason that such excellent results are obtained by bleachers and dyers in Switzerland.

IMPURITIES.

The impurities found in waters are principally suspended matter (dirt), carbonates of iron and magnesium, calcium carbonate (chalk), calcium sulphate (gypsum) and magnesium sulphate (epsom salt). In addition to these substances there is always present a certain amount of carbon dioxide which renders the carbonates of lime and magnesia soluble. The presence of these compounds gives the water the character of "hardness." This term probably had its origin in the fact that when we wash our hands with such water it is impossible to obtain a lather, in consequence the soap will not slip and so feels "hard." If iron is present we speak of chalybeate water, while the presence of sulphur in the form of sulphureted hydrogen is characteristic of the so-called "hepatic waters." These latter possess such marked medicinal qualities and are encountered so seldom that they need not be further discussed here. If a sample of water deposits a white sediment on boiling it is said to possess "temporary hardness." If the clear liquid which is obtained by filtering this water does even then yield no lather with soap the water is said to possess "permanent hardness." The former is due to the presence of carbonates of lime and the like, while the latter is caused by the presence of gypsum and the like. Before using such water for textile processes it must, in nearly all instances, be purified in order to insure the best results.

PURIFICATION.

There are several methods of purification, among which may be mentioned distillation. This is, as a rule, too expensive although some silk works use such water to a small extent. Attempts have, however, been made of late years to introduce commercial stills for water. The cost varies from 10 cents to 30 cents per 1,000 gallons.

The second method is filtration, a process which is suitable in cases where a soft but muddy river water is at hand. The filtration process does not remove the lime compounds dissolved in the water, and is, therefore, useless in such cases. A clear water may contain immense quantities of dissolved mineral matter.

The third method at our disposal is that of precipitation followed by filtration. An example of this is the caustic soda treatment. The water is first analyzed in order to determine the amount of mineral matter present. Caustic soda is then added in order to remove the carbon dioxide. As soon as this is removed the carbonate of lime is precipitated. If soda ash (carbonate of soda) be mixed with the caustic the sulphate of lime will be changed into carbonate of lime (insoluble in water). The so treated water is then passed through a filter in order to remove the substances which have been thrown out of solution. If this process is carefully watched the results obtained will more than pay for the extra trouble and expense. If not properly tended to it becomes a very dangerous method for purifying water for textile processes.

CORRECTION OF WATER.

The correction of water consists in the addition of acids which neutralize the carbonates and bicarbonates, for these are, after all, the most undesirable of the various impurities which menace the dyer. The acids used for this purpose are acetic and sulphuric. In the operation of boiling-off the gum from raw silk, the water is first boiled-off with ordinary soap and the scum (lime soap) formed is removed with a scoop. A sulphated castor oil preparation (monopol soap) has been recommended for this purpose as it forms soluble compounds with lime and magnesia. It is used in the proportion of three pounds per 100 gallons.

(*To be continued.*)

MERCERIZING LAWNS.

In white mercerized lawns a sharp, crisp, but not hard feel is general required. In a few cases a bright finish is required, but in most cases, the pure mercerized luster is what is wanted generally. A good cover is what is asked for. These require damping, and all the creases straightening out, after which give two nips on a three-bowled dead set hot calender, then stiffen according to the requirements of the cloth generally. Half a pound of dextrine to the gallon of water is all the filling that is required, after which three or four nips with a good set on a wood and brass calender will give the final finish.

Particular attention must be given to these mercerized lawns as too often they are frayed. The threads are displaced in the process of bleaching and this must be remedied or the goods will be returned. The only way to overcome this difficulty is to use the jig motion on the stentering machine. During this process the goods have to be watched and treated very carefully, as being so delicate in texture they are apt to give way on the selvage and get badly damaged.

The swinging of the jig motion must be regulated to suit the class of cloth. A long and slow swing or a shorter, quicker swing makes all the difference in the various classes of cloth or the nature of the fray. This remedy is always very risky, and any manager or master of a works should take care that during the first processes and the bleaching and mangling the threads are kept straight and not dragged through any deep washing machine or over anything that is likely to fray the goods, as the mending of these frays in addition to the risk, adds greatly to the cost of finishing.

The 352 cotton, woolen, silk and knitting mills of North Carolina show an authorized capital of $54,192,300 and the employment of 3,110,099 spindles, 54,812 looms, 6,232 knitting machines and 133,851 horse-power.

MARKET REVIEWS.

THE COTTON MARKET.

H. & B. BEER.

The final figures of the census report on the quantity of cotton ginned and to be ginned this season were issued March 20, and fully confirmed our ideas so often expressed as to the probability of this year's cotton crop being 13,500,000 bales. The report is made us as follows:

	1908	1907	1906
Counting round as half bales ..	13,408,811	11,325,882	13,305,265
Round bales included in above .	242,305	198,549	268,219
Sea Isl. bales included in above	93,848	86,895	57,550
Linters, bales included in above	344,970	268,060	322,064
Average gross weight of bales .	50,808	50,202	51,009
Number of ginneries operated..	27,587	27,577	28,702

Based upon the above statement we figure that there is only about as much cotton held by farmers as there was held at this time last year and year before last, notstanding this season's crop to be about 2,000,000 bales larger than the crop of last season, and about the same size as that of season before last, in which year prosperity was at high tide, particularly in the textile line. When the present price of cotton is compared with its value at this period one year ago and in 1907, it will be found that cotton is relatively cheap, as the following table proves:

	1908-09	1907-08	1906-07
Actual growth, linters included .	13,409,000	11,326,000	13,305,000
Marketed prior to Sept. 1st ...	106,000	30,000	107,000
Rm'ing to be marketed Sept. 1.	13,303,000	11,296,000	13,198,000
Amount marketed to date	11,635,000	9,666,000	11,702,000
Remaining on plantations	1,668,000	1,630,000	1,496,000
Value of middling, New Orleans	9 1-4	10 3-4	10 11-16

The world's visible supply of American cotton, however, while larger than last year's holdings—4,012,000 against 3,242,000—is no larger than the amount on hand year before last, which was 4,024,000. In so far as stocks of last year at this time are concerned, they were ample for the demand existing at that time, the panic being on and business entirely upset.

At this moment conditions are gradually working back to normal, and it is our opinion that trade will be active in all countries, especially in the United States, and that more cotton, by about 500,000 bales, will be required during the balance of this season than was used the balance of last season. Therefore, the excess in the world's visible supply of American cotton will soon disappear. The South will probably hold firmly the remnant of this crop, which is of good grade and quality.

At the present moment receipts are light and are apt to keep so for some time to come, especially if new crop prospects become less favorable. We have kept in close touch with weather conditions during the past winter, and are aware of the fact that Texas has not had sufficient rain to permit of the best results.

There has been less rain in Texas during the past winter than was the case two years ago when only about a half a crop was made in the State. Meanwhile the month of March has been almost free from rain west of the Mississippi River, and though some rain occurred in Texas the middle of the month, the average precipitation for the State could hardly be more than a half inch.

A fairly good start in crop preparations has been made in the East Gulf and South Atlantic States, but the rainfall during March has been so excessive in that section, particularly in Tennessee, Alabama and Georgia, that farm work has been virtually suspended, and at the moment heavy rains are now falling throughout the eastern half of the cotton region which will retard planting operations in that territory all the more.

As matters stand now it may be said that preparations are backward in Texas, Alabama, and the South Atlantic States, the only section having fairly good weather being the lower Mississippi Valley, but it will not be long before the weevil will be complained of in this latter district.

As to the acreage, indications are that there will be no increase when the belt is taken as a whole, for while new land is being opened in west Texas, this will be offset by a reduction in Louisiana on account of the destruction inflicted by the weevil last year and because of farmers in others States having been schooled in the necessity of diversification, which is being realized as the only salvation of the South, especially since grain and provisions are selling at such high prices as to make it expensive to grow cotton.

Under the circumstances we think cotton is cheap and spinners will do well to continue buying and not depend upon the uncertainties attending the making of a new crop.

COTTON YARN MARKET.

The conditions are peculiar, the market is weak, and, taking into consideration the price of spot cotton, prices are lower relatively than they were a year ago during the panic. For instance on 16/2 ply skein, sales have been made as low as 15 cents, on the other hand sales of good quality have been made at 17 cents. On the 20/2 ply there have been some sales made as low as 17 cents, but only a few of them, and good orders have been booked at 17½ cents to 18 cents during the past few days.

Some of the agents have large stocks on hand and have been slaughtering them. The dealers have been quoting low prices also with the expectation of getting some of the mills to come to their ideas of price.

The market is rapidly coming to a condition where it will compel a great many mills to curtail, and when prices advance, of course there will be a radical change, as they are now below the cost of production. Some mills which saw the situation early enough have taken orders to run them through for the next sixty days, and their wisdom in doing so is now apparent.

We look for a better demand at low prices from now on. There is also a feeling in the North and the South that cotton must go lower, and with 9 cent cotton there will be some relief to the spinner, although yarns are selling below a parity of 9 cent cotton.

There has also been some low prices made by the mills quoting direct, and in their anxiety to get business they have gone back on the commission houses and have tried to do business direct. The consequence has been that in

some instances they have not only got the business, but they have made lower prices. It is simply a repetition of their endeavors in this direction a few months ago.

On single warps the prices have been hammered down unmercifully and a great many mills have come into the market for work. Still these are no lower relatively than other sizes.

On hosiery yarns the demand has been a little light. The weakness in price has been caused by the desire of Northern mills to take orders. When cotton was very much higher and conditions very much firmer the Eastern mills took orders commencing in May and running into October at prices, in some instance, lower than the Southern mills were holding for. The consequence was that they made the price on the market at that time and prevented any advance.

SOUTHERN SINGLE SKEINS.

4s to 8s	14½@15	22s	17 @18
10s to 12s	15 @15½	26s	18 @19½
14s to 16s	15 @16	30s	20 @21
20s	17 @17½		

SOUTHERN TWO-PLY SKEINS.

4s to 8s	14½@15	30s	19½@20
10s to 12s	15 @15½	36s	22
14s	15½@16	40s	23½@24-25
16s	16½	50s	29 @30
20s	17	60s	38 @39
24s	18	3-ply 8s upholstery	15
26s	18½	4-ply 9s upholstery	16

SOUTHERN SINGLE WARPS.

8s to 10s	15	22s	17½
12s	15½@16	26s	18½@19
14s	16	30s	20 @20½
16s	16½@17	40s	23 @24
20s	16 @17		

SOUTHERN TWO-PLY WARPS, ETC.

8s to 10s	15	26s	19
12s to 14s	15½@16	30s	20
16s	17	40s	24
20s	17½	50s	31
24s	18½		

SOUTHERN FRAME PEELER CONES.

8s	15	20s	17½@17¾
10s	16	22s	18
11s	16¼	24s	18½
12s	16½@16¾	26s	19
14s	17	30s	20½
16s	17¼	40s	23¼@24
18s	17½		

THE KNIT GOODS MARKET.

This market is not at all satisfactory, nor as good as was anticipated at the opening of the year. There is said to be, however, a steady call for spring hosiery in the jobbing houses and from retailers. Solid colored hosiery is mostly in demand, and for this there is a wide variety of colors of which retailers need to carry an unusual line to meet the needs of the trade, and for this reason are forced to renew their stock quite often. There has been a marked change in the demand for solid black and tan of the staple qualities, but the disposition of consumers, both men and women, is to buy varieties that match ties or fabrics. There is a demand among jobbers for full fashioned hosiery of a staple character for spring and summer sales. There has been a better demand for these goods in the higher priced lines. The fall lines of hosiery and underwear are still in little demand.

The low price of yarn is disturbing knitters considerably, as it affects the sale of goods, and buyers are urging lower prices in consideration of the fact that yarns can be bought at lower values, with little consideration that many of the goods now being manufactured are made from yarn purchased at high prices.

SOUTHERN COTTON MILL STOCKS.

Quotations by F. C. Abbott & Co.,

Charlotte, N. C.

	Bid	Asked		Bid	Asked
Aiken Mfg. Co.	75	85	Lanett	94	97
American Spinning	145	...	Langley Mfg. Co.	90	96
Arkwright Mills	...	...	Linden, N. C.	100	105
Arlington	...	166	Limestone	140	...
Avondale	115	125	Loray, pref 1901	...	96
Augusta, Ga.	60	...	Lowell	...	...
Bonnie	121	...	Mooresville, N. C.	110	...
Bloomfield	...	118	Lumberton	...	236
Brandon Cot. Mills	145	...	Mills Mfg. Co.	...	104
Brookside	...	103	Modena Mills	...	115
Capitol City, pref.	...	82½	Mollohon	...	105
Chadwick-Hoskins Co.	...	91	Monarch, S. C.	...	102
Clara	...	121	Newberry	...	146
Clover	...	...	Nakomis N. C.	...	156
Clinton	...	...	Olympia, 1st	...	86
Clifton, pref.	...	104	Ozark	125	150
Cliffside	160	165	Patterson	...	125
Chiquola Cot. Mills	130	...	Piedmont Mfg. Co.	...	171
Cherokee Mfg. Co.	...	...	Pelzer	...	152
Converse	...	...	Pell City, com	...	95
Dallas Mfg. Co., Ala.	95	...	Pell City, pref.	100	...
Dillon	65	68	Saxon	...	126
Efird, N. C.	125	...	Sibley, Ga.	60	...
Elmira, pref.	96	...	Social Circle	99	...
Eagle & Phoenix	...	121	Spartan Mills	...	135
Easley	150	155	Springstein	...	...
Edenton, N. C.	...	...	Statesville Cot. Mill	107	...
Exposition	...	240	Trenton, N. C.	...	...
Fairfield	75	...	Tryon, N. C.	...	143
Florence, N. C.	...	131	Tuscarora	115	...
Gaffney Mfg. Co.	74	76½	Tucapau, S. C.	200	...
Gaston	...	110	Toxaway	...	93
Gainesville	49	...	Union Buffalo, 1st pref.	...	65
Gibson	...	...	Union Buffalo, 2d pref	12½	...
Graniteville, S. C.	160	168½	Victor Mills, S. C.	...	125
Gray Mfg Co.	121	126	Warren Mfg. Co. pref	103	...
Grendel	...	119	Washington Mills	28	30
Greenwood	...	71	Washington Mills pref.	...	108
Highland Park	...	170	Watts	...	92
Hartsville, pref.	100	...	Wareshoals	...	...
Hartsville	...	...	Whitney	...	125
Inman Mills S. C.	...	107	Wiscassett	125	...
Kesler	135	...	Woodside	...	103½
Jno. P. King Mfg. Co.	91½	...	Woodruff	...	124
Lanaster, com	125	...	Williamston	...	108

NEW ENGLAND MILL SHARES.

FALL RIVER MILLS.

By H. M. Haffards & Co., Fall River, Mass.

	Bid	Ask		Bid	Ask
American Linen Co.	...	125	Merchants' Mfg. Co.	...	117½
Arkwright Mills	...	105	Mechanics' Mills	...	116
Barnard Mfg. Co.	...	116	Narragansett Mills	...	140
Bourne Mills	98½	...	Osborn Mills	...	115
Cornell Mills	182½	...	Parker Mills	...	99
Chace Mill	135	...	R. Borden Mfg. Co.	180	185
Davol Mills	100	103	Seacomnet Mills	...	92½
Davis Mills	...	132½	Shove Mills	...	95
Flint Mills	106	108	Stafford Mills	...	115
Granite Mills	...	152½	Stevens Mfg Co.	90	...
Hargraves Mills	102½	104	Tecumseh Mills	...	148
King Philip Mills	175	180			

NEW BEDFORD MILLS

By Sanford & Kelly, New Bedford, Mass.

	Bid	Ask		Bid	Ask
Acushnet Mills	325	...	Nonquitt Spinning	128	...
Bristol Mfg. Co.	...	145	Page Mfg. Co.	119	...
Butler Mill	1?0	...	Potomska Mills	125	...
City Mfg. Co.	250	2?3	Pierce Mfg. Co.	350	...
Dartmouth Mfg. Co.	250	255	Soule Mill	160	...
Gosnold Mills pf	106	...	Taber Mill	100	...
Grinnell Mfg. Co.	210	...	Wamsutta Mill	132	...
Kilburn Mill	...	165	Whitman Mills	142	...
Manomet Mills	185½	187			

OTHER NEW ENGLAND MILLS.

By Philip M. Tucker, 35 Congress St., Boston.

	Latest	Previous		Latest	Previous
Appleton	153	148	Great Falls	197	194
Amoskeag	301	304	Hill	55	65
Androscoggin	155-155	155	Jackson	997	960
Arlington	146	145	Lancaster	140	141
Atlantic	76	74	Lawrence	170	165
Bates	222	220	Lockwood	101	102
Boston Mfg. Co	46	46	Lyman	115	114
Boston Duck	1325	1275	Massachusets	131	132
Cabot Mfg. Co.	88	95	Monadnock Mills	1017	960
Chicopee	103	100	Nashua	542	527
Continental	79	78	Naumkeag	125	125
Dwight	1175	1065	N. E. Cot. Yn. com	74	75
Edwards	116	115	Pepperell	296	295
Everett	130	127	Trem't & Suffolk	112	112
Franklin	115	114			

Some cheap grades in balbriggan have been put on the market and buyers are taking these readily for quick delivery. There is a certain demand for light weight cot-

ton ribbed goods, but the supply available for shipment is a long way short in meeting requirements.

The mild weather conditions have served to bring out a better call for light weight underwear supplies, but heavy weight fall underwear is dragging at the present time. Some of the Philadelphia hosiery mills are quite busy on gauze lines of women's hosiery.

The manufacturers about Utica, except those on women's Swiss ribbed goods, are running slowly because of slackness in orders. They have not yet made any reduction in their operating force, because they expect heavy demands on short notice and want to be in a position to fill them, in view of the evident fact that there is a dearth of manufactured stock. The demand among these mills for sweater coats and sweaters continues good. One mill is reported as increasing its output of sweater coats, while it is estimated that two-thirds of the production of the mills at Little Falls, all of which are busy, is sweaters.

Knitting manufacturers are very much concerned in regard to the tariff that is being discussed in Congress, and it is declared that any reduction in the present tariff rate would naturally have to be met by lowering the American standard of wages, or by driving manufacturers entirely out of the field for medium and the better grade of goods.

The Textile Mill Situation in New England and the South.

NEW ENGLAND MILL SITUATION.

(*Special Correspondence.*)

While there has been a falling off in demand for cotton fabrics the undertone of the market continues firm and very favorable. Slight concessions have been made on prints to stimulate business, but finer counts hold firm with demand exceeding supply and contracts placed for late summer and early fall deliveries. A canvass among Boston and New York commission houses has established to the writer, beyond a question of doubt, that the cotton fabric market is on a better basis than for nearly two years. Textile machinery men report a satisfactory business.

One of the most prominent commission men in Boston stated to the writer that he believes there is nothing but prosperity for cotton mills for the next three or four years. It is his opinion that there has been a thorough house-cleaning during the last eighteen months and unsalable fabrics that have been hanging over the market for a number of years, have been disposed of and are now in the hands of the consumers. Economies have been put into practice and manufacturing costs reduced all around.

A Maine cotton mill has reduced its manufacturing costs, on a staple line of fine goods, exceeding 15 per cent., while a Fall River superintendent has cut down his cost of manufacturing 22 per cent. compared with 1907. Throughout the New England states there has been greater economy and closer figuring of manufacturing costs than for many years which has done more to re-establish prosperity in the textile trade than any other development. Unquestionably this readjustment of manufacturing conditions was the primary reason why the textile industry was the first of the fundamental industries to free itself from general industrial depression and regain its economic equilibrium.

During the past six weeks the demand for fabrics for export has been confined to a particular brand of drills and several standard sheetings. The South American trade has bid several times for large lots of three-yard and 3.50 sheetings, but manufacturers have been unwilling to sell at their bid price. It is understood that a question of whether the discount shall be three or two per cent. off stands between a sale of six thousand bales of standard sheetings for the Red Sea trade. China has purchased 9,000 bales of three-yard, and 5,000 bales of 3.25 sheetings this month and are interested in about the same quantity for early April delivery.

The home market is just between seasons. Active buying for the spring has ceased and a feeling prevails that until after the tariff schedule is arranged there will be only hand to mouth buying. Converters are buying in this way and there is little probability of a change of policy for the present. A large number of fine goods mills are sold into the summer and early fall months at prices that will show a satisfactory profit. There has been a slight easing off in narrow fabrics, while Fall River prints have sagged slightly. Ginghams and ticks are sold into late spring delivery and prices hold at best with a steady demand from the western states.

The market for cotton yarns continues very unsatisfactory to both spinner and consumer. Weaving yarns are heavy and there is great irregularity in the finer counts of skein yarns, 40s being quoted at 23 cents and 50s at 28 cents. There is a great deal of complaint regarding the quality of yarns being delivered which has done much to keep the yarn market irregular. There is little curtailment going on, so spinners fear an unsatisfactory market for some months to come. Weavers expect lower prices on carded yarns and staple counts before July 1.

Textile machinery makers report a very much improved demand for weaving machinery among the southern trade and are generally sold ahead two to three months. Looms seem to be in urgent request and prices have stiffened materially since the first of March. Spinning machinery is quiet, although large orders have been placed for fall delivery. Draper Co., and Crompton & Knowles Loom Works are operating full time.

Cotton mill stocks continue to advance in price with demand unsatisfied. Every Boston broker that handles textile securities has a large number of orders to buy such stocks as Bates, Androscoggin, Pacific and Massachusetts at almost any price, but the fact is, there are no stocks on the market and a bid of 5 to 10 points above the last sale does not bring out any stocks. Pacific sells higher at every sale and is now quoted at $3,350 per share. Other gilt edge stocks are selling at the highest prices ever quoted and unless dividends are increased there will be much disappointment among those who have purchased these stocks on an income basis of from 3½ to 4½ per cent. A manufacturing stock should net at least 5 per cent. on the money invested. Fall River and New Bedford stocks hold firm at best prices.

SOUTHERN MILL SITUATION.

(*Special Correspondence.*)

The situation affecting Southern yarn mills for the month past has been very unsatisfactory. The hoped-for

business boom following the opening of the new year has not materialized, in fact for eighteen months or more the hard yarn business has been seriously demoralized. During the months of November and December there was a slight boost in market quotations, but since the first of the year business has been dull, and the markets in a bad state of demoralization. Operations have been on a hand-to-mouth basis and all lines of business unsettled. Hard yarn mills have suffered to a more serious extent than soft yarn and cloth mills, but in no line of the textile industry has business been anything like normal.

Recently the Southern "Hard Yarn Spinners' Association" met in Charlotte and appointed a committee to act on the matter of curtailment of production. In the opinion of spinners present at this meeting, by this means only can business be restored to a normal basis. An agreement was drawn up by this committee binding mills, under a forfeit of $100 per thousand spindles, to curtail, commencing March 1st, for three months. An inspector was to have been appointed to visit the mills represented in the associations to see that the agreement was being rigidly enforced. Curtailment to the extent of 33⅓ per cent. was to have been ordered.

Later, however, after consulting with legal advisers, this committee, of its own accord, decided to drop this plan of effecting curtailment, realizing that such an agreement might be in violation of the Sherman anti-trust laws. Accordingly the members of the association were informed that the agreement was not to be followed out. In place, each member of the association was heartily advised to curtail, it being urged that by this means only can the markets be restored to a normal basis. Thus the matter stands to-day. The association believes curtailment alone can effect the much desired remedies for a bad situation, and a large part of the spinners represented in the association are following this plan. Secretary T. W. Crews is of the opinion that the yarn men, realizing fully the gravity of the situation, will curtail. He states that he has received many letters from spinners who announce their intention to act thus, and gives this letter from a prominent spinner, as a sample of the many received: "Our people have decided to curtail production. We will begin this week. We have decided on this policy independent of the action of other mills. We hope that all the hard yarn spinners will see the necessity of curtailment and will, of their own motion, decide to do so. For the present we shall run only enough to take care of deliveries on orders, and if the market does not improve we see nothing short of a final shut down."

A few of the Southern mills are sold ahead and can not curtail. But, in the opinion of Mr. Crews and others conversant with the general feeling, the majority will adopt the curtailment plan. "I believe the Southern mills will do their part in restoring prices," said Mr. Crews when asked for a statement, "and if the North will help us the business will get better. It is my opinion that the yarn men of the South will voluntarily curtail at least 33⅓ per cent."

There are some mill men who predict a general shut-down unless conditions improve during the next month or so, though it seems to be the general belief that curtailment of one-third of production will result in dissipating the present accumulation of stock, and force an upshoot in prices to a living basis.

The prevailing opinion of spinners in the South is that the Northern association should join with the Southern association in bringing about the desired results. The North has not done its part in the fight, and it is believed with general co-operation in the curtailment movement a remedy may be effected. Unless this is done it is likely the mills will be forced to shut down, as some have already done. Secretary T. W. Crews sent out this statement, under date of March 20, to members of the "Hard Yarn Spinners' Association," which is self-explanatory:

"I have been advised by mills representing 475,000 spindles that they will curtail production at least 33⅓ per cent. during three months, commencing March 1st. A number of these mills inform me that they are only running on half-time, and, unless there is an early improvement in prices, they will stop producing yarns entirely. I have also been advised by mills representing 117,000 spindles that they are running on orders and are not in position to curtail. They will not accept orders at present prices, and, as soon as present orders are completed, they will curtail production. Curtailment and refusal to accept prices now being offered are the only means by which the spinners can restore prices to a living basis. That they can assist in relieving the present depression by operating their mills along the above lines is absolutely beyond question."

It is nothing short of remarkable that in the face of the most unfavorable market conditions perhaps ever experienced in the yarn business, and despite a general apathetic state of affairs all along textile lines, there is no let up whatever in new mill construction work. The panic of the last year will be remembered for the shrinkage in this respect. Fewer new mills were established in 1908 than for many years previous. Many contemplated improvements at the first of last year went over. To-day in all parts of the South there is unusual activity in the work of improving and enlarging mill properties. Changes planned last year are being put into effect now. New machinery is being installed, additions made to plants, and in many cases mill capitalization is being greatly increased. Scarcely ever before was there a period when more new mills were springing into existence. A large number of new mills have been chartered during the months of January, February and March, and others are under contemplation. For example, in North Carolina during the past ten days two of the largest mills in the South have been put under way; one at Durham, by the Erwin and Duke interests, and another at Marion. The Durham mill, when completed, will be equipped with 50,000 spindles and will be capitalized at over one million dollars. This one instance is cited merely to show that, although the markets are woefully demoralized, capitalists of the South appear to have an abiding faith in the future of the industry, and are willing to invest their funds, believing that the present depression can not last long.

One of the demoralizing influences has been the doubt as to what kind of tariff legislation will be passed by Congress. At a recent meeting in Atlanta the cotton manufacturers placed themselves on record, in no uncertain terms, on the tariff question, and the action of the present Congress is awaited with interest.

NEW MACHINERY AND TRADE NOTES

"ROTO" BOILER TUBE CLEANERS.

Economy of fuel, all day and every day, throughout the year is the practical demand on the steam plant. Boiler users are interested in this "all year" economy rather than in the test performance when the boilers are new.

For fuel economy, there must be efficient absorption of heat by the steaming water. If the heat surfaces of the boiler are scale coated, much of the money paid for coal is lost in unabsorbed heat passing up the stack. Boiler scale is highly resistant to heat. Even a thin layer of scale on the tube surfaces retains bubbles of vapor which still further blanket the water from the hot gases, and greatly reduce the steaming capacity and fuel economy of the boilers.

To make steam cheaply and get full power from the boilers, the tubes must be kept clean, allowing actual contact of the water with a clean and polished metallic surface of the boiler tubes.

Following, is a brief description of a new boiler tube cleaner which is claimed to be far in advance of older devices in effectiveness, speed, durability and ease of handling. These new tube cleaners will be exhibited at the textile machinery exhibition in Boston April 26th to May 1st, where their use and construction will be fully shown to all interested.

that the cleaners offered are durable and harmless to the tubes, while they are very effective in removing scale and reducing the coal bill.

These tube cleaners are of the rotary type and consist of a very powerful, high speed rotary motors, driving hardened steel scale removing tools which are of different construction for water tube and fire tube boilers. This rotary type of cleaner does not hammer and can not injure the boiler tubes.

Figure 1 shows a standard Roto air driven cleaner equipped with a heavy scale head at work in a water tube boiler. The air or steam pressure required is very low and safe while the speed and power obtainable are far greater than possible with the older water driven or turbine tube cleaners. When steam is used provision is made for keeping the boiler tubes cool and free from expansion.

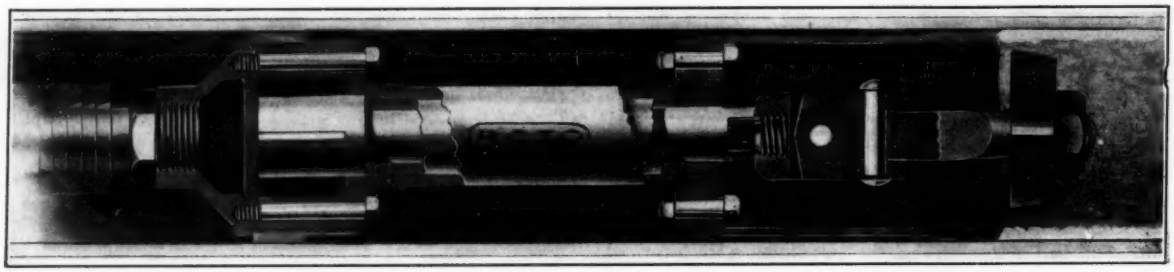


Fig. 1.

Figure 2 shows the double bearing type of motor used for smaller size tubes and for bent tubes. The cross sectional view shows the very simple construction of the motor, and the means whereby great speed, power and durability are obtained in a motor of very small external diameter allowing the entire device to pass through the boiler tube on the end of a flexible hose supplying the motive power. The cleaner can be used in all types of boilers and in all locations without any rigging or special structure.

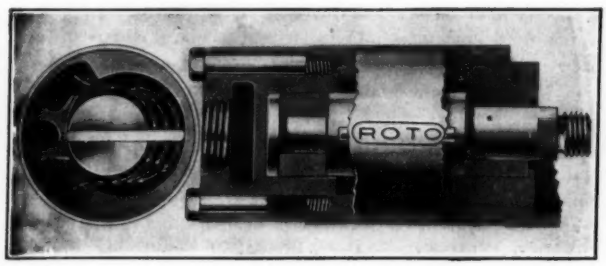


Fig. 2.

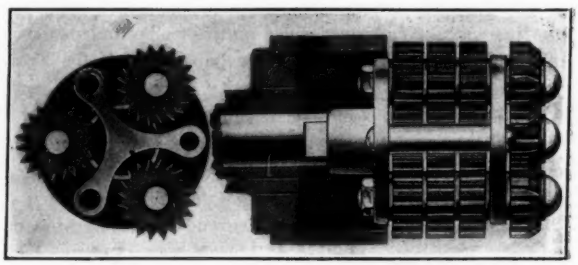


Fig. 3.

The makers of this device— The Roto Company, Hartford, Conn.—offer unusual opportunities for free trials to demonstrate the value of their cleaners in reducing the cost of steam production. On request, they will send cleaners on trial, and an engineer to co-operate with the engineers of the plant in selecting, by actual tube cleaning in their boilers, the cutter heads and tools best suited to their conditions. The machines and engineer are furnished for such trials, free of cost to the user, and the trials can be extended to prove to the entire satisfaction of the plant engineers

Figure 3 shows a light scale or polishing head carrying a large number of toothed cutters held against the scale by the centrifugal force resulting from the high rotative speed, often exceeding 6,000 revolutions per minute.

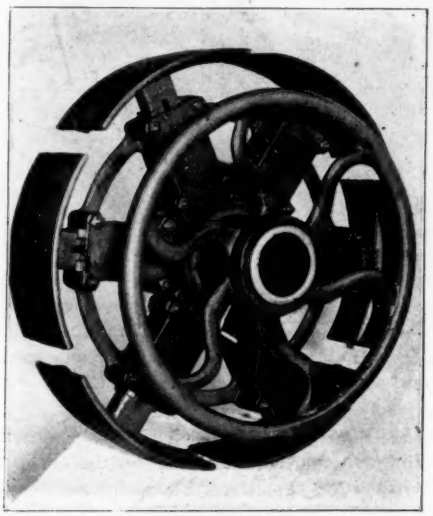
AN EXPANSION PULLEY.

The Taylor & Fenn Company, Hartford, Connecticut, has placed on the market an expansion pulley that is designed so that the parts are interchangeable, and by man-

ufacturing these pulleys in quantities a high grade pulley is produced at a low cost.

There is a large field for these pulleys. Where two or more machines are run in conjunction, the cloth passing directly from one machine to another, it is important to regulate the speed of these machines so that there may be a uniform tension on the cloth. This result is best obtained by driving the machines by expansion pulleys. By adjusting these pulleys to the proper diameter the correct speed may be obtained.

The rim of this expansion pulley is made up of segments cast to the arms. The arms sliding in guides in the center are adjustable for different diameters by means of screws which are operated by the hand wheel to which they are connected by bevel gears. This hand wheel may be locked in any desired position by means of a binding screw, thus preventing any change of adjustment.



Expansion Pulley.

In the manufacture of these pulleys great care is taken to insure the absolute interchangeability of the parts, thus decreasing the cost of production and making it possible to replace at once any parts which might be broken. By means of interchangeable bushings any size bore up to 4¾" may be obtained.

These pulleys are regularly manufactured in four diameters, each side having an adjustment in diameter of four inches and a standard width of face of six inches. The sizes are 18"-22", 23"-27", 28"-32" and 32"-36". The 18"-22" size has four arms and the other sizes six.

There are a large number of these pulleys in use among the textile mills and their popularity is constantly increasing.

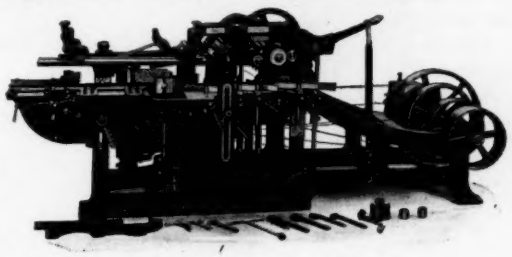
MOLDING MACHINES.

The H. B. Smith Machine Co., of Smithville, N. J., has been building molding machines for more than sixty years, some of its patents dating as early as 1847 and 1852.

H. B. Smith the founder of the business, was conceded to be the first to cast the frames whole for molding machines, and the company has followed his example ever since because it makes rigid frames with no joints to get loose.

The early machines were designed for working soft woods which were used when Michigan supplied the bulk of white pine, but within the last ten years it has redesigned all of its molders, and have brought out an extra heavy line for working hard woods.

The eight-inch molder herewith illustrated is a new machine of substantial design, but not of its extra heavy pattern. It is a heavy machine, however, and is very strongly driven. It may be described as follows:

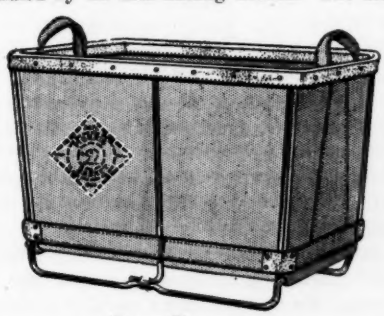


Heavy Outside Moulding Machine.

The table is adjustably gibbed to the frame and adjusts up and down by a single screw which rests on ball bearings and is adjusted by a winch from the front. The cutter spindles are all made of high carbon steel, carefully turned and ground to fit the bearings. The headstocks of the upper and under heads have longitudinal adjustment, and the vertical heads or spindles have vertical, lateral and angular adjustments. The feed mechanism is composed of two upper feed rolls, driven and expansively geared so as to drive in any position of the table. The under head, besides having a horizontal adjustment and being removable from the spindle, has an adjustment to regulate the amount of cut.

SPRING BOTTOM DUCK BASKETS.

We illustrate herewith the spring bottom duck basket manufactured by Morris & Company, Groveville, N. J., which is extensively used in cotton, silk and woolen mills and is handled by all mill finding houses. The frame is a



Duck Basket.

very important part of the basket; it is made of high-grade, round spring steel, and different sizes are used for various sizes of the baskets. This steel will not break, and it takes a severe blow to bend it. The connections are made with seamless steel tubes, thus bracing the frame in all directions. The bottom is formed of iron bands securely fastened to the frame. The covering is made of cotton duck.

TREATMENT OF WASTE.

Cotton spinners are fully alive to the benefits that arise from economical working, and it does not seem necessary to remind them not to overlook the pecuniary advantages to be derived from a careful distribution or disposal of the waste made in their mills. In the various processes of

preparing and spinning cotton there is an unavoidable discharge of fibrous material, which, if properly treated, can be turned to profitable account.

The waste given off at the different stages varies in quality, and is usually classified as follows:

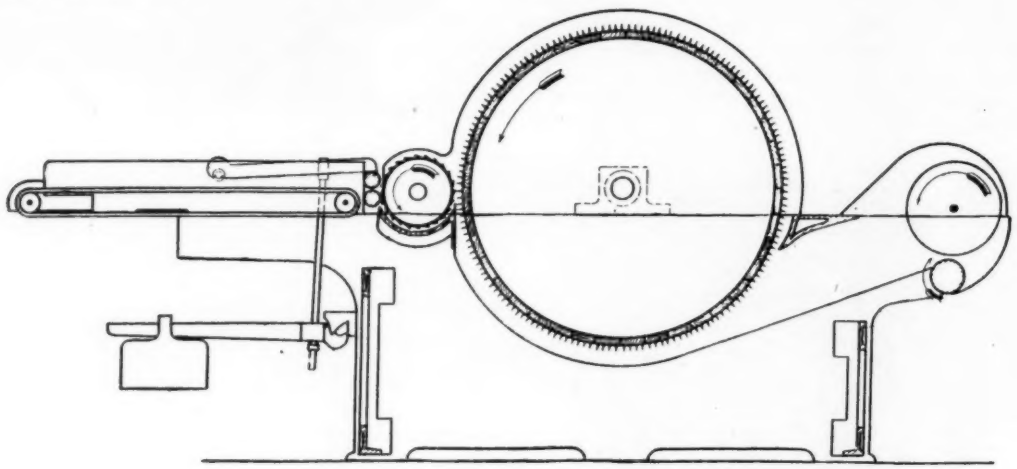
Blowing room waste or droppings, which is practically valueless.

Carded or soft waste, which can be used again with the new cotton, without special treatment.

Spinning room waste, which, on account of its twisted condition, must be put through special machinery.

Roving and clearer waste.

teeth of the clothing catch and pull the cotton in such a manner as to cause it to be carried round in short lengths. On its way, the material is transferred from the small to the large cylinder by the aid of a knife-edged guide-plate. It is then opened, the twist taken out, and delivered in a loose state in various ways, to suit the requirements of the blowing room. To prevent damage arising from hard substances foreign to the waste getting into the machine, the feed arrangement is provided with a reversing motion, which can be brought into action very quickly by the attendant simply pulling over a lever on the left side of the machine.



Cotton Waste Machine.

Roving and clearer waste has been the most difficult for the spinner to deal with. Although of good quality, this waste has undergone a slight twisting, and is not in a fit condition for mixing with the card and draw frame waste; nevertheless, it is much too good to go with that from the spinning room.

It has been a common practice to pass this material through the scutcher along with the opened cotton, but on account of its stringy condition the twisted portions are liable to make their appearance in the subsequent processes. Some spinners have employed a hard waste breaking-up machine, such as is used for spinning room waste, oftentimes with indifferent results, which have led them to discontinue using up this kind of waste.

The accompanying illustration shows a waste machine with pedal feed, long lattice feeder, and cage and roller for delivering the material into a movable receptacle. This machine is capable of modification in details to suit special wants and fit special conditions.

It is claimed that the operation of this machine neither spoils the evenness of the cotton nor weakens the yarn. The material is treated gently on entering the machine and this assists the opening operation in contrast to the effect of striking direct by the main cylinder, which, as experience has proved, is far too severe. This gentle pulling or plucking, which takes place before the cotton encounters the opening cylinder, is effected by the aid of a small cylinder covered with a special kind of clothing.

The waste is fed to the machine on an ordinary travelling lattice, and is drawn to the small cylinder by a pair of feed rollers. The surface speed of the former is much greater than that of the feed rollers, and as it revolves the

A BALL WARPER.

The accompanying illustration gives a perspective view of an improved ball warper made by the Globe Machine and Foundry Co., Frankford, Philadelphia.

The machine in its entirety consists of three parts,

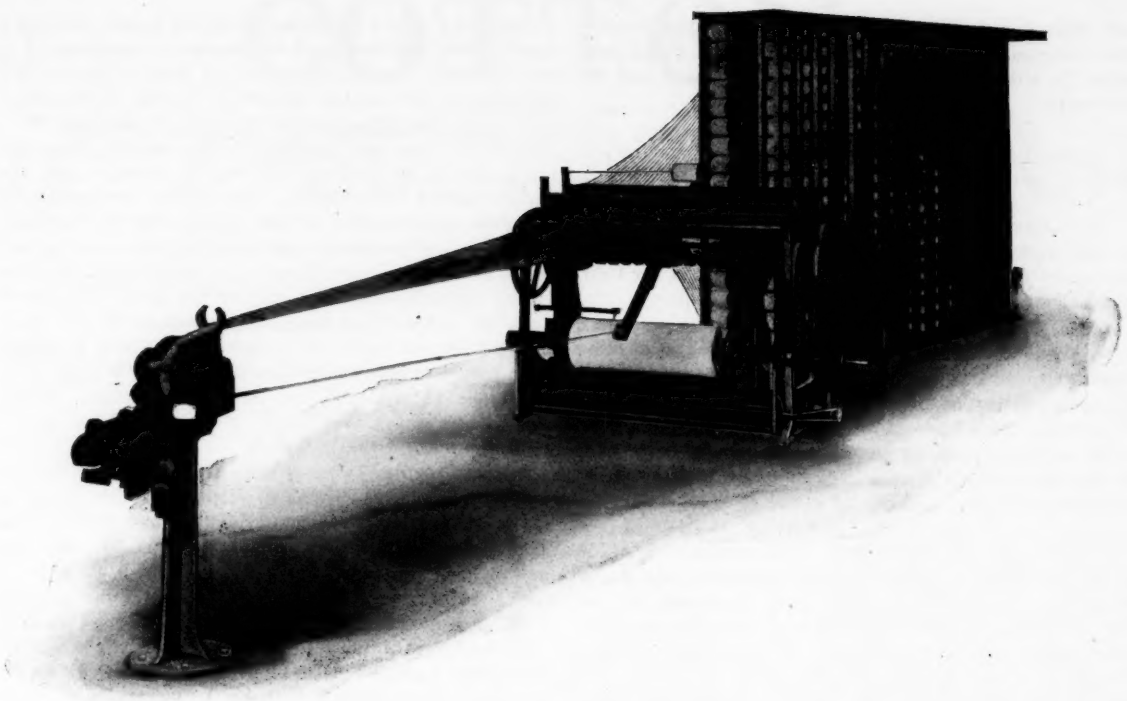
(1) The creel for holding the bobbins.

(2) The measuring device, and

(3) The winding mechanism.

The creel is of the V-type shape, with a direct pull, the thread of each bobbin being in turn passed separately through a detector wire, loosely pivoted on an upright piece of the creel and which forms one terminal of the circuit of the electrical stop motion, the detector wire being arranged on the upright piece so as not to interfere with any movement of each other. Situated just behind this upright piece is a contact strip, which forms the other terminal for the electric circuit, so that when a detector wire swings down on its pivot, it forms a contact with the strip and thus completes the circuit with the consequent releasing of the levers and the shifting of the belt.

The section of ends, as coming from the creel, in turn passes through a guide reed, over and under several guide rollers, through the lease reed and in turn to the measuring device, as situated some distance away in front of the warper. This device is carried on a pedestal and is equipped with two dials, viz., a large dial for measuring the total length of warp put on the shell (beam for holding the ball warp) and a small dial for measuring the length of a cut. The large dial is made to indicate up to 24,000 yards, although as a rule only up to 10,000 to 12,000 yards are used, the smaller dial being made to measure up to 1,000 yards. Either dial can be set to any number of yards



Ball Warper.

below numbers quoted, to suit the amount of yarn desired to be put on the shell or desired number of yards in cut. Two leases are taken between each cut. Both dials are connected with the electric stop motion of the warper as well as with a bell. When the bell rings and machine stops, it indicates that either a cut has been wound on and leases have to be taken, or that the desired length of warp has been wound on the shell and that the latter is to be doffed. When, however, the warper stops minus bell ringing, it then indicates to the operator that a thread has been broken in the creel or betwen the guide rolls, *i. e.*, previously to the thread coming near the lease rod.

The warp is wound on the shell by a direct drive instead of by friction roller drive, as done in machines of former construction. This does away with all chafing or roughening of the yarn due to slippage of the friction roller, as well as squeezing out of layers at the ends of the ball due to the necessary pressure on the friction roller. It also preserves the elasticity of the yarn.

The speed changing device is automatic in its operation, the speed being governed by the size of the ball wound. It is accomplished by the differential motion, producing a uniform speed of yarn from creel to shell, all the time, no matter what the size of the ball on the shell.

The speed of the machine is from 50 to 60 yards per minute.

Dyeing and Cleaning of Textile Fabrics. This is the title of a hand book for the amateur and professional, by F. A. Owen, based partly on notes of H. C. Standage, and published by John Wiley & Sons, New York. The different processes of dyeing and cleaning are classified as much as possible. Directions for dyeing occupy the first part of the book, while cleaning and re-dyeing are treated afterward. A fairly complete account of all of the ordinary processes practiced in the art of dyeing is given, and a description of the various classes of dyewares in common use. The price of the book is $2, and can be procured of the Cotton Publishing Co., Atlanta, Ga.

Water Filters. This is the subject of a short treatise published by Hungerford & Terry, Philadelphia, relating to systems of filtration, in which manufacturers are more or less interested and especially those operating dyeing establishments and bleacheries.

Cotton Mill Map of North and South Carolina. This is the title of a map published by E. H. Anschutz, Charlotte, N. C., showing the counties, county seats and only such cities, towns and villages where cotton mills are located, each mill being designated by a solid square, which squares are numbered and referred to in an index with a key number giving name of the mill, etc., with the number of spindles and consumption per year. The map also shows the exact location of all hydro-electric power plants, both in operation and proposed. It has been designed to show the things that are needed by the mill owner and operator, cotton broker, cotton buyer, mill and electrical supply men, and their travelling representatives, and all dealers in cotton products and machinery. The map is published as a wall map, 46x70 inches mounted on muslin, or as a pocket map 20x30 inches, folded into a convenient size, with leather cover.

Textile Department, A. & M. College, West Raleigh, N. C. We are in receipt of a folder giving the courses of instruction in this institution, pertaining to the manufacture of cotton. There are seven courses given by this school so arranged as to meet the needs of all students. Information can be obtained by addressing the principal, Thos. Nelson.

Cassella Color Co., New York. The Boston office of this company has been moved to 39 Oliver street. The

new quarters make more than double the floor space heretofore occupied, which additional room has been found necessary to accommodate the needs of the company and its customers.

Stewart & Sons, Philadelphia. This firm has moved its place of business to Jasper and Orleans street, this city.

The American Moistening Co., Boston, Mass., report a large increase in business dating from January 1, 1909, having received orders from 34 distinct companies for their humidifying apparatus.

"Fear Not to Sow." This is the title of a neat, combined calendar and blotter issued by the Geo. H. Gibson Company, advertising engineers, Tribune Building, New York City. They advise manufacturers of engineering supplies and equipment to prepare the way for large sales during the resumption of business by means of intelligently directed, educational publicity.

Turbine for Textile Mill. The purchase of a 750 K.W., two-phase, 30-cycle, 440-volt turbo-generator set by the Lyman Mills, Holyoke, Mass., is but an indication of the satisfaction which electrical apparatus has given in their textile mill. For some years Westinghouse induction motors have been installed throughout the mill to drive the various machines with a total capacity of 900 horse-power, and have given eminent satisfaction. Recently the company decided to install additional generating capacity and purchased a turbine from The Westinghouse Machine Company designed for 150 pounds steam pressure with 50 degrees superheat and 28 inches vacuum. This turbine unit is now being built at the Westinghouse shops, East Pittsburg.

The Eureka Fire Hose Manufacturing Company, 15 Barclay street, New York, has been at work for a number of years in perfecting what they recently placed on the market in their Eureka solid woven cotton belting, intended for both transmission and conveying. It is woven under an immense tension in one solid body, and, therefore, has no plies to separate. A natural tendency of the belt in work is to form itself into a coil which in service adheres to the pulley and makes a powerful drive. The texture of the belt allows of the escape of air between the pulley and the belt.

Soluble Oils, Alizarine Assistant, Turkey Red Oils, of different percentage for use in finishing, dyeing, printing, etc., as well as for sizing and finishing compounds for textile goods of every description can be obtained of the Arabol Manufacturing Company, New York. By equipment and management this company is well prepared to meet any demands. It is up-to-date in methods and products and has the reputation of turning out reliable and uniform goods.

Muralt & Company, New York City. This company has been awarded the contract for remodelling and enlarging the water-power plant on the Peconic River, at Tower Mills, L. I. New turbines of the vertical shaft type will replace the old water wheels now in use and an additional unit of the same general design will be installed.

The Economic History of the United States. This is the title of a book that rehearses the political and industrial efforts of a virile and energetic people who have appropriated and developed the wonderful resources of a new continent toward a realization of ideals of liberty and government. The author—Ernest L. Bogart, of Princeton University,—has presented the purpose of this book in a remarkably clear and comprehensible manner from the standpoint of an instructor thoroughly familiar with the various phases of his subject. The colonial development of the great opportunities of the country, and the economic integration and industrial organization of the producing energies of the nation are discussed so lucidly that none can fail of comprehending their purport, and beneficial influence upon the character of those most affected. It is a book that the general reader of current political and industrial news should possess and be familiar with, as helpful to an intelligible understanding of transpiring events. (Longmans, Green & Co., New York. Price $1.75)

Hungerford & Terry, Philadelphia, Pa. This firm of filter manufacturers reports a number of large orders in the water purification line during the last few months. These installations range in capacity from two and one-half million gallons per day of the gravity type down to one hundred thousand gallons per day of the pressure type. Among the more noteworthy can be named those at the Revolution Cotton Mills, Greensboro, N. C., which are installing a 1,300,000-gallon filter plant for their new bleachery; the Durham Hosiery Mills No. 1, Durham, N. C., which have installed a pressure plant of 200,000 gallons daily capacity, and a second order from the Durham Hosiery Mills for their No. 3 mill at High Point, N. C.; the Melville Woolen Co., Fredericksburg, Va., and the Dan River Power & Mfg. Co., Danville, Va.

Inefficient filter plants installed in various parts of the South have been responsible for the belief that Southern waters are not suitable for the textile industry. The successes which the mills employing Hungerford & Terry filters have made indicate that all that Southern waters need is efficient filtration to give the best kind of results in the textile trade.

Messrs. Hungerford & Terry are prepared to give the most rigid guarantee with all of their installations. They also manufacture in addition to filters, water softeners and plants for the removal of iron from water.

Coal and Ashes Handling Machinery in Power Plants. The Jeffrey Mfg. Company, Columbus, Ohio, has issued its catalogue 32A illustrating its coal and ashes handling machinery for power plants, fully illustrated. This conveying machinery is applicable to almost every conceivable purpose where it is necessary to handle products to any distance or of considerable weight. These mechanical appliances can be used for handling coal to the bins and boilers; carrying ashes from the boilers to some place of deposit; loading barges and vessels, etc.

J. E. Lonergan Co., 211-213 Race street, Philadelphia. This company has been incorporated with a paid in capital of $200,000. John E. Lonergan is president,, M. A. Hudson vice-president, H. S. Whitney secretary, and W. E. Crofton treasurer. H. S. Whitney and M. A. Hudson were connected for many years at New York and Chicago with Manning, Maxwell & Moore, and their affiliated companies; the Asheroft Mfg. Co.; The Consolidated Safety Calve Co.; The Hayden & Derby Mfg. Co., and the Hancock Inspirator Co. This company manufacturers steam goods specialties of all kinds.